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Collaborative Problem Solving as a Treatment for Hearing Caregivers with Deaf Children

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Collaborative Problem Solving as a Treatment for Hearing Caregivers with Deaf Children

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Collaborative Problem Solving as a Treatment for Hearing Caregivers with Deaf Children

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Disruptive behavior disorders rates are higher in deaf children compared to their hearing peers, suggesting that Oppositional Defiant Disorder (ODD) is developed and maintained by deaf-specific and common determinants. This proposal addresses the lack of evidence-based treatments for deaf children with hearing caregivers by designing an experimental study of a randomized controlled trial with a treatment and a waitlisted control group. Between and within group data analyses will be conducted to determine the treatment efficacy of the Collaborative Problem Solving approach in reducing aggression, ODD severity, disruptive behavior, and ODD symptoms while improving child-reported relations with parents. Facilitators and barriers to treatment efficacy and client satisfaction will also be assessed to guide future intervention research.

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Chapter 1: Introduction

For every 1,000 infants in the United States, two to three are identified with hearing loss (Centers for Disease Control and Prevention [CDC], 2007). Despite an increase in overall awareness of deafness as evidenced by technological advancements and improved access to social services and early childhood intervention, social-emotional development in deaf children continues to be a concern. Deaf children are one and a half to four times more likely to have internalizing and externalizing mental health issues than their hearing peers (Fellinger, Holzinger, Sattel, Laucht, & Goldberg, 2009; Hindley, 2000; Hindley, Hill, McGuigan, & Kinston, 1994; Stevenson, McCann, Watkin, Worsfold, Kennedy, & Hearing Outcomes Study Team, 2010; Theunissen, Briaire, Soede, Kouwenberg, & Frijns, 2014; Van Gent, Goedhart, Hindley, & Treffers, 2007). Furthermore, deaf[1] children with externalizing symptoms generally have higher rates of aggression, noncompliance, and inattention than their hearing peers (Barker et al., 2009; Mitchell & Quittner, 1996; Van Eldik, Treffers, Veerman, Verhulst, 2004; Vostanis, Hayes, & Du Feu., 1997).

Externalizing disorders consist of behaviors that are overt and disruptive to oneself and to others (Campbell, Shaw, & Gilliom, 2000; Eisenberg et al., 2001). These disorders include the following behavioral characteristics: hyperactivity, delinquency, and aggressive behaviors (Hinshaw, 1987). Externalizing disorders, disruptive behavior disorders (DBDs), and other terms such as "antisocial" and "conduct problems" are synonymous and therefore used interchangeably (Liu, 2004). While deaf children may appear to have higher rates of externalizing disorders or DBDs, it is often complicated by unique challenges that are specific to the deaf population (Dammeyer, 2018; Edwards & Crocker, 2007; Hindley et al., 1994). Lack of treatment for deaf children with behavior problems could further complicate social-emotional development, academic performance, and language development (Dharitri & Murthy, 1990).

[1] "deaf" represents the broad range of individual, group, types of education models and settings, and community contexts, unless specifically noted.

Studies, although limited, have found that Oppositional Defiant Disorder (ODD), one of the most prevalent disruptive behavior disorders among children and adolescents (Substance Abuse and Mental Health Services Administration, 2017) is more common among deaf children than their hearing counterparts (Fellinger et al., 2009; Theunissen et al., 2014). In a nationally representative cohort, lifetime prevalence estimates for adolescents with ODD were 12.6% (Merikangas et al., 2010) and point prevalence estimates for children with ODD range from 2 to 16%. In the DSM-IV, ODD was described as persistent symptoms of negativity, hostility, and defiant behavior that occurs at least once a week for six months or longer for those who are five years old and older (American Psychiatric Association [APA], 1994). Consequences of untreated ODD include persistent behavioral problems (Lavigne, Lebailly, Hopkins, Gouze, & Binns, 2009; Keenan & Wakschlag, 2002), significantly increasing the odds of developing additional or comorbid disorders (e.g., anxiety and depression) (Granic & Lougheed, 2016). Additionally, those who do not receive treatment for disruptive behavior problems are significantly more likely to develop antisocial behaviors that drain economic costs from educational, health, and criminal justice systems beyond childhood and into early adulthood (Pelham, Foster, & Robb, 2007; Reinke, Eddy, Dishion, & Reid, 2012; Schaeffer et al., 2006). Thus, a plethora of evidence justifies the need to promptly address disruptive behavior disorders. For unique reasons, such interventions may be especially important for deaf children.

Contrary to popular belief, being deaf or having some form of hearing loss during childhood does not itself directly increase the risk for mental health problems (Zand & Pierce, 2011). Nevertheless, the presence of hearing loss is often a proxy for growing up in an environment where information and communication are not consistently accessible, increasing the likelihood of delayed development and mental health problems. For nearly 50% of deaf children, behavioral problems persist despite receiving typical early childhood intervention services (e.g., corrective hearing support, speech therapy, and language interventions) (Stevenson et al., 2011; Theunissen et al., 2014) and "high rates of mental health problems in deaf children persist across generations, countries, and educational approaches" (Dammeyer, 2018, p. 2). These findings support the notion

that hearing loss or deafness itself is not a risk factor (see Bigler, Burke, Laureano, Alfonso, Jacobs, & Bush, 2018 for a review). More specifically, nearly 96% of deaf children are at-risk of facing these unique challenges because these children are born into hearing families with little to no experience or background in interacting with deaf individuals (Mitchell & Karchmer, 2004; Vaccari & Marschark, 1997). Thus, hearing parents may inadvertently place their deaf offspring at-risk for poor language development, social skills, coping skills (e.g., problem-solving), delayed theory of mind, attention and executive functioning problems, and externalizing disorders due to limited or lacking incidental learning.

Incidental learning occurs passively (without intentional participation), often during overheard conversations between two or more people that may contain valuable information for the listener (Calderon & Greenberg, 2003). Common examples of this phenomenon are when a child in another room overhears conflict and resolution between their parents at home or learns something from the radio on a short trip home from school. While lack of incidental learning affects all deaf individuals, the extent of its impact relies on the capacity of the environment to make information accessible. For those who are born to deaf parents (approximately 4% of the deaf population), incidental learning is significantly less restricted and communication challenges are mitigated, which is key for the critical developmental period (from birth to five years old) (Snow & Hoefnagel-Hohle, 1978). Consequently, social-emotional and language development among deaf children of deaf parents were found to not differ from their hearing peers (Vaccari & Marschark, 1997; Harris, Clibbens, Chasin, & Tibbitts, 1989; Meadow, Greenberg, Erting, & Carmichael, 1981). This implies that communication has to be accessible and effective, but for deaf children whose auditory access is limited, thriving in an environment that only uses spoken language as a means to communicate with one another is likely to be challenging.

When incidental learning is restricted or lacking in the home environment early on, it leads to a domino effect that affects language development and snowballs into years of dealing with lagging skills, poor social-emotional development, and finally, the emergence and maintenance of disruptive behavior disorders. Language is central to optimal development across human beings in

cognition, emotional and behavioral regulation, interpersonal relationships, and social identity (Hintermair, 2015). The odds of developing mental health disorders are four times higher among deaf children who regularly struggle to communicate effectively with their than those who do not experience the same struggle (Fellinger, et al., 2009).

Since unique risk factors (such as being born to hearing parents, experiencing limited access to communication, language, and incidental learning) are exclusively experienced by the majority of the deaf population, deaf children are set up for greater risk of developing DBDs than their hearing peers. Unfortunately, interventions for deaf children with disruptive behavior are understudied – especially those that address the above-mentioned proximal risk factors beyond the mere presence of hearing loss or being deaf. While parents, teachers, medical, mental health, and social service providers are all affected by the deaf child's mental health status, many of them are ill-equipped to provide the type of care that addresses the deaf child's needs (see Dammeyer, 2018).

On a larger scale, the impact of conducting studies on the deaf population allows for more meaningful contributions to the mental health field, particularly because the field benefits from learning how language development, as well as communication, interacts and affects one's well-being, mental health, and social-emotional development (see Dammeyer, 2018). Due to multiple studies that consistently show higher rates of DBDs in deaf children and the lack of effective interventions for this population, this paper aims to take the field one step further by proposing an efficacy intervention study. This intervention study proposal intends to address the proximal variables previously discussed. Next, an integrative analysis of the literature within the field will be presented and a brief summary of the study proposal’s purpose will follow.

Chapter 2: Integrative Analysis and Interpretation

The following integrative analysis will review the Coercion Theory (Patterson, 1982) as it delineates pre-existing conditions and interactions across settings (e.g., home and school) that are known to increase the odds of developing and maintaining DBDs in the general population. A complementary framework with particular relevance for what leads to changes in human behavior, the COM-B framework (Michie, van Stralen, & West, 2011), will be introduced next. Following this is a discussion on the existing literature's identification of contributing factors for the higher rates of DBDs in deaf children compared to their hearing peers. After a review of limited interventions tested with deaf children, evidence for the Collaborative Problem Solving (CPS) (Greene, 1998) approach for treatment will be considered. Finally, the COM-B framework (Michie et al., 2011) will be integrated into the discussion to provide a rationale for how CPS could potentially treat DBDs in deaf children with hearing caregivers.

Patterson's Coercion Theory and the COM-B Framework

This study proposal draws upon Coercion Theory (Patterson, 1982) and the COM-B Framework (Michie et al., 2011) to provide a rationale for the treatment of complex family systems with hearing parents and their deaf children. The application of theory is fundamentally necessary when evaluating complex interventions that typically involve behavior change in humans and the mechanisms that may be likely to address specific problems identified by the literature (Clarke, 1987; Glanz & Rimer, 2005). Therefore, applying Coercion Theory in conjunction with the COM-B framework will help explain contributing factors that that either exacerbate and alleviate DBDs in deaf children.

Coercion Theory. Patterson's Coercion Theory (1982) describes mutually reinforcing feedback loops, also known as coercive cycles, between parents and their developing child that lead to the emergence and maintenance of aggressive and aversive behavior over time (Patterson, 1982; Patterson, Reid, & Dishion, 1992; Reid, Patterson, & Synder, 2002). This theory serves the primary purpose of delineating the mutually reinforcing behavior patterns that parents and children with DBDs are locked into, and how such coercive cycles necessitate disruption through effective

intervention. These cycles comprise both coercion and permissiveness imposed by both the parent and the child. For example, within a parent-led coercive cycle, a parent may place a demand on the child and the child may escalate by whining, refusing to do the task, or becoming aggressive and the parent may either escalate until the child complies (coercion) or withdraw the demand to avoid escalation from the child (permissiveness). However, this cycle further reinforces aversive behavior from the child and is likely to strengthen and maintain said behavior over time as the cycle between the parent and the child repeats. Alternatively, within a child-led coercive cycle, a child makes a request or a demand for something and escalates (temper tantrum or aggression) once denied until the parent either reacts with coercion or permissiveness.

The early-onset antisocial development trajectory claims that coercive cycles can manifest as early as 18 months (Martin, 1981; Shaw & Winslow, 1997), and that the frequency and duration of these cycles across different activities (e.g., snacking, learning how to play a game with the parent, etc.), can increasingly restrict the child's affective states (Hollenstein, Granic, Stoolmiller, & Synder, 2004). Furthermore, over time, less is required to trigger another coercive cycle between the dyad as they become more predisposed to this type of interaction. Having repeated restrictive parent-child interactions leads to the child developing limited coping strategies. This may place the child at a disadvantage when enrolling at daycare or pre-school where it is necessary to be flexible or behave in accordance with the demand of the environmental context for positive development. Otherwise, responding in the same way despite being in different contexts suggests insensitivity to contextual demands and is linked to antisocial development (Jones, Reid, & Patterson, 1975). Often, children exhibiting DBDs face peer rejection as they continue to respond with aggressive and aversive behavior toward their peers. These children also perform poorly in academics, which may be another negative source that induces shame. Repeated experiences of shame from academic failure and peer rejection without the child's ability to adapt behaviorally and emotionally, may lead to depression (Patterson & Capaldi, 1990). This constant cycle between them, their prosocial peers, and poor academic performance is likely to lead them to find other

peers who share similar antisocial tendencies and perspectives. When they grow older, these overt behaviors are often replaced with covert behaviors (e.g., lying, stealing, etc.).

COM-B Framework. The COM-B framework as shown in Figure 1 (Michie et al., 2011) serves two purposes in this proposed study. First, this framework will help grasp a better understanding of the challenges facing families of hearing parents with deaf youth. Second, it provides structure to explain how the mechanisms of the CPS treatment approach may produce efficacious intervention results with the proposed population of interest. In other words, the COM-B system provides a framework to grasp the nature of the problem behavior and the components that may facilitate behavior change in deaf children with disruptive behavior disorders who have hearing parents. That is, for B (behavior) to occur according to the COM-B model, the presence of three core components is required: C (capability), O (opportunity), and M (motivation) (Michie et al., 2011).

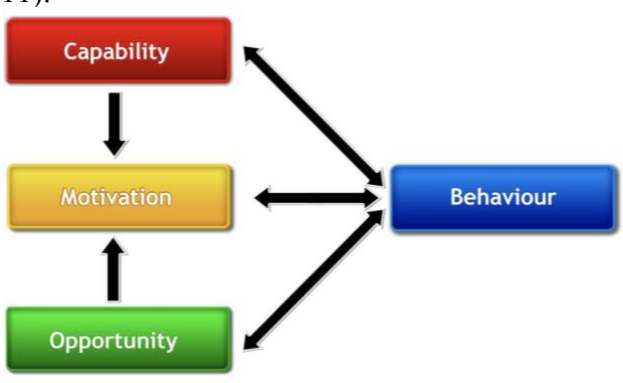

Figure 1. COM-B Framework (© Michie et all, 2011; licensee BioMed Central Ltd.)

According to the model, *capability* is described as possessing adequate physical and psychological ability as well as prior knowledge of how to conduct the behavior (Michie et al., 2011). *Opportunity* is understood as the necessity for promotive environments that cover both the physical *and* social aspects. Availability of the appropriate resources is important for the physical environment to be supportive of the change in behavior. There are two parts to the condition of motivation: automatic processes (e.g., basic needs, habits, and emotional reactions) and reflective processes (e.g., evaluating the cost-benefits of engaging in the behavior). In other words, the presence of adequate physical and psychological ability, supportive and barrier-free environments,

and incentive-targeted behavior are all necessary prerequisites in producing the targeted behavior (Michie et al., 2011). Note that the level of behavior change may vary depending on the context or relevance for each of the three conditions. Since nearly all deaf children are born to hearing parents who lack prior knowledge on deafness, deaf children are at risk of experiencing delayed or limited capability and opportunities to thrive (Hall, Eigsti, Bortfeld, & Lillo-Martin, 2016). In particular, families who only use spoken language are inadvertently restricting their deaf child's access to information which precedes language, communication, and social-emotional skills development. A repeated lack of opportunities to develop these crucial skills are likely to reduce overall capabilities, which may decrease the interactions and communication between deaf children and their hearing parents (Barker et al., 2009). This can lower their self-efficacy and therefore weaken their motivation, and lead to learned helplessness (Arnold, Palmer, & Lloyd, 1999) which further exacerbates the constraints on their opportunities, capabilities, and motivation and increases their likelihood of developing DBDs.

Risk Factors of DBDs in the General Population

There are pre-existing risk factors that set the parent-child dyad up for the emergence and maintenance of disruptive behavior disorders. Child risk factors, parental risk factors, and environmental risk factors will be briefly reviewed (see Granic & Patterson, 2006 for complete review).

Child Risk Factors. These factors are pre-existing conditions within the child that are linked to antisocial behaviors include genetic influences (see Raine, 2002; Eley, Lichtenstein, & Moffitt, 2003), prenatal factors (e.g., exposure to toxins and birth complications) (e.g., Day, Richardson, Goldschmidt, & Cornelius, 2000; Needleman, Riess, Tobin, Biesecker, & Greenhouse, 1996). Prenatal risk factors may lead to difficult temperaments that are linked to DBDs (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Rutter, Giller, & Hagell, 1998). Additionally, children who demonstrate antisocial behavior in early childhood also manifest comorbidities such as Attention-Deficit/Hyperactivity Disorder (ADHD; Hinshaw, 1987, 1994)

and significant verbal and executive functioning deficiencies (Moffitt, 1993; Rutter et al., 1998; Tremblay, Pihl, Vitaro, & Dobkin, 1994).

Parental Risk Factors. Pre-existing conditions within the parent that result in limited parent-child interaction are also found to associate with the development of the child's antisocial behaviors. Maternal depression and parenting stress both increase the likelihood of coercive cycles (Granic & Patterson, 2006). Additionally, parents who also have DBDs are more likely to have poor prosocial problem-solving skills and a higher likelihood of using coercive discipline strategies (Patterson et al., 1992).

Environmental Risk Factors. Finally, there is a third set of pre-existing conditions within the environment. These conditions refer to low socioeconomic status (SES) (Bradley & Corwyn, 2002), residing in areas with elevated rates of crime and violence (Offord, Boyle, & Racine, 1991), and divorce-related stress mediated through poor familial problem-solving and parenting (see Granic & Patterson, 2006 for review; Forgatch, Patterson, & Skinner, 1988; Forgatch, Patterson, & Ray, 1996).

Unique Circumstances of DBDs in Deaf Children

Since nearly 96% of deaf children have hearing parents (Mitchell & Karchmer, 2004) who are typically unfamiliar with the deaf population (Fellinger et al., 2005), the majority of deaf children face unique challenges where they are immediately deprived of information and knowledge that would stimulate their development – merely because exchanges of information primarily travel through sound. Thus, an environment that does not adapt to the deaf child and enable them to thrive due to a lack of or limited auditory access and incidental learning leads to obstructions in language acquisition and thus, language ability. Because language is a necessity and a precursor to cognition and social-emotional development (e.g., executive functioning, theory of mind, intellectual functioning, problem-solving), especially for the developing mind, facing such barriers to language acquisition at an early age is likely to create prevalent issues in the child's development (skill deficits) and manifest as aggression and disruptive behavior (Coll, Cutler,

Thobro, Haas, & Powell, 2009). Some particular variables that may influence risk are discussed next.

Degree of Hearing Loss. While it is plausible that deaf children with less severe hearing loss would demonstrate better psychosocial outcomes, there are multiple findings that argue against this assumption. Despite successful early childhood hearing interventions for deaf children (cochlear implantation [CI] or hearing aids), behavioral problems persist in deaf children at a much higher rate than in the general population (Hindley & Kitson, 2000). Rates of mental health disorders or problems did not differ between deaf children with and without CIs (Dammeyer, 2010; Kouwenberg, Rieffe, & Theunissen, 2011). Additionally, no associations were found between degree of hearing loss and mental health risk (Bottcher & Dammeyer, 2013; Theunissen et al., 2014) or psychological adjustment and behavior problems (Brubaker & Szakowski, 2000; Fellinger et al., 2009). However, several studies presented contradicting findings. For example, based on teacher and parent reports, adolescents with less severe hearing loss was associated with greater attention and rule-breaking behavior problems than those with more severe hearing loss (Leigh, Maxwell-McCaw, Bat-Chava, & Christiansen, 2009). A prevalence study of psychiatric disorders also suggested that deaf children with profound hearing loss were less likely to be diagnosed with ODD than those with moderate hearing loss (Fellinger et al., 2009). Authors noted that hearing parents of deaf children with more severe hearing loss may have more tangible perceptions of communication capabilities whereas necessary adjustments to communication with family members may not be as apparent among those with less severe hearing loss (Leigh et al., 2009). Families who possess less awareness of communication adjustments often report more disruptive behaviors (Harvey, 2003; Laszlo, 1994; Pipp-Siegel, Sedey, & Yoshinaga-Itano, 2002). Additionally, children with more severe hearing loss are more likely to be identified and receive timely and more tailored intervention services as a result (Kochkin, Lux-ford, Northern, Mason, & Tharpe, 2007).

Auditory Access. The degree of auditory access may explain the conflicting findings regarding hearing loss and behavior problems in deaf children. When a deaf child has greater

auditory access, which refers to one's ability to understand spoken language without lip-reading (e.g., talking over the phone), access to incidental learning is likely to be greater. While it is easy to assume that deaf children are likely to exhibit externalizing problems regardless of the degree of hearing loss, it is more accurate to interpret that degree of hearing loss does not equate to auditory access. Therefore, for deaf children who solely use spoken language, it may be more relevant to look at the extent of auditory access and how it naturally relates to their access to communication with their hearing parents. In one study, when deaf children could engage in a conversation without experiencing barriers their psychosocial issues were no longer different than their hearing peers (Dammeyer, 2010). Therefore, a reduced, or lack of auditory access and an unaccommodating environment that does not provide information through visual means is a potential root issue among deaf children who only use spoken language to communicate with their hearing parents. When this issue continues to exist, barriers to incidental learning are likely to persist and give rise to additional risk factors such as poor language development and limited background or world knowledge in deaf children.

Access to Language. Exposure to language and the linguistic experiences of deaf children are tied robustly to their social and cognitive development (Hintermair, 2015). Findings from a longitudinal study indicated the importance of early access to language as well as the quality of parent-child interactions in predicting optimal development in deaf children (Hart & Risley, 1995). Specifically, the *caliber* of what parents shared with their deaf children from birth to 3 years old and *how* they conversed with them was significantly predictive of their lexical development and reading skills in third grade (Hart & Risley, 1995). In addition, deaf children with language delays experience challenges with regulating their own behavior, emotions, and attention (Barker et al., 2009; Vaccari & Marschark, 1997). Finally, significant relationships found between language and communication skills and behavior problems were found in deaf children, but not in hearing children (Castellanos, Kronenberger, Pisoni, 2018). This pattern of relationships between language and communication skills and behavior problems in deaf children is consistent with other studies (see Stevenson et al., 2015 for a review).

Executive Functioning. Executive functioning (EF) is another key contributor to behavior regulation. This construct accounts for these five well-known elements: inhibition, working memory, flexibility, and motivational or emotional self-regulation (Barkley, 1997a,b, 2000, 2001; Fuster, 1997; Roberts & Pennington, 1996). Deaf children without the opportunity to fully acquire a language due to poor environmental fit were more likely to demonstrate lower executive functioning (Hall et al., 2016) which may contribute to the development of ODD. For example, one recent US study on long-term CI users did not specifically examine ODD prevalence rates in deaf children, but it did study the relationship between executive functioning and language in psychosocial outcomes, including oppositional behavior (Castellanos, Kronenberger, & Pisoni, 2018). This study found that language abilities were significantly associated to oppositional behavior, in addition to adaptive skills, global behavior problems, and attention in deaf children (Castellanos et al., 2018). This pattern of associations was not found in hearing children, however (Castellanos et al., 2018). The study's findings suggest that when it comes to oppositional behavior, language skills are more relevant to these psychosocial outcomes than it is for hearing children (Castellanos et al., 2018).

Not surprisingly, there is a strong relationship between language deficits and elevated behavioral issues in deaf children (Barker, Quittner, Fink, Eisenberg, Tobey, & Niparko, 2009). However, research suggests that linguistic ability predicts attention, which is fundamental to regulating one's behavior (Barker et al., 2009; Bennett Murphy, Laurie-Rose, Brinkman, & McNamara, 2007). In short, the relationship between behavior problems and language delay in children are partially mediated by the ability to self-regulate their attention (Barker et al., 2009). Children with language difficulties may subsequently develop learning disabilities and other psychosocial issues in adolescence or adulthood (Law, Rush, Schoon, & Parsons, 2009).

Theory of mind. While the theory of mind (TOM) has been shown to be delayed in children with ODD (de la Osa, Granero, Domenech, Shamay-Tsoory, & Ezpeleta, 2016), it is also commonly delayed in the population of late signing deaf children from hearing families (Peterson & Siegal, 2000; Peterson, Wellman, & Liu, 2005). TOM is the capability to grasp one's own and

other's intentions, perspectives, and preferences (Gallagher & Frith, 2003). The root cause of this delay is once again attributed to the limited access to language and communication that deaf children often experience with hearing parents (de Villiers, 2005) Deaf children of deaf parents achieved higher on theory of mind tasks than deaf children of hearing parents (Meristo et al., 2007; Peterson & Siegal, 1999; Schick, de Villiers, de Villiers, & Hoffmeister., 2007).

Deficits in fund of information. "Fund of Information" or background or world knowledge. Due to a lack of or limited auditory access while growing up in spoken language contexts, deaf individuals often have a decreased fund of information compared to their hearing peers (see Calderon & Greenberg, 2003; Israel, Cunningham, Thumann, & Arnos, 1992), known as "fund of information deficit" (Pollard, 1998). An environment dependent on audition for the exchange of information is a poorly designed fit for a deaf child with limited auditory access. This poor environmental fit has far-reaching implications that have yet to be sufficiently realized by the dominant mainstream society. With a decreased fund of information, personal resources to adapt and make decisions in a variety of situations are more limited for deaf children than their hearing peers (see Lomas, Andrews, & Shaw, 2017). This restricted fund of information from the limited auditory access of deaf children raised in spoken language environments may manifest as poor problem-solving skills, heightened impulsivity, a lack of adaptive emotions, and naturally, increased behavior problems.

Problem-solving. Problem-solving requires three core skills: 1) identifying the problem or problematic situation, 2) development of several possible solutions to problems, and 3) capability to predict possible consequences (see Spivak & Shure, 1974; Greenberg & Kusche, 1998). One study found that despite narrowing the gap as they grew older, the problem-solving skills of deaf children continued to lag behind their hearing peers (Luckner & McNeil, 1994). Once again, poor language development or delays is identified as the contributing factor to this lagging skill (Luckner & McNeil, 1994) which may be attributed to limited auditory access in an environment that solely uses spoken language to communicate.

Parent-Child Dynamics. Higher levels of stress reported by parents are often associated with poorer social, emotional, and behavioral outcomes in their children (Crnic & Low, 2002; Hintermair, 2006; Quittner et al., 2010). A combination of linguistic challenges from limited access to language and the quality of parent-child communication may result in greater behavior problems in deaf children of hearing parents, which plays a major role in parenting stress (Quittner et al., 2010). While parenting stress were comparable between hearing parents of deaf children and hearing parents of hearing children (Abserg, Vogel, & Bowers, 2008; Meadow-Orlans, 1994; Pipp-Siegel et al., 2002), hearing parents with deaf children consistently reported higher levels of parenting stress than parents of hearing children on measures that captured deaf-specific circumstances (Lederberg & Golbach, 2002; Quittner, Glueckauf, & Jackson, 1990; Quittner, Steck, Rouiller, 1991). Specifically, hearing parents of deaf children reported greater symptoms of anxiety and depression than those with hearing children (Quittner et al., 1990; Quittner et al., 1991).

Parent-child communication difficulties have consistently ranked as the number one parent-reported deaf-specific stressor for nearly 20 years (Quittner et al., 1990; 1991; 2010; Zaidman-Zait & Most, 2005). Deaf children with language delays may struggle with understanding their hearing parents' instructions or demands and often internalize maladaptive coping strategies modeled by their parents over the years (Theunissen et al., 2014). This finding supports the interpretation that children's behaviors are much more difficult to manage when parent-child communication is already poor (Quittner et al., 2010). When deaf children get older, parent-child communication may become more challenging (due to the increase in language complexity), and parenting stress may be more likely to increase (Meadow-Orlans, 1994). Additionally, as stress levels increase for parents, harsh, punitive, and controlling parenting become more likely (Webster-Stratton, 1990).

Coercive cycles among deaf children and hearing parents. In the context of non-signing hearing parents, inaccessible receptive language over time (due to limited auditory access) is likely to affect their deaf children's language development, including problems with expressing their

needs. As this frustrating experience persists through early childhood, the deaf child may escalate by engaging in tantrums or aggressive behaviors which may lead the parent to perceive the child to be difficult or even problematic (Koester & Meadow-Orlans, 1999). Furthermore, due to ineffective communication, hearing mothers implemented coercive approaches such as physical discipline along with controlling and directive parenting with their deaf children more often (with and without cochlear implants) than hearing mothers of hearing children (Knutson, Johnson, & Sullivan, 2004; Spencer & Meadow-Orlans, 1996). Another study found that hearing parents who only use spoken language to communicate with their deaf child were more likely to adopt physical means of discipline than parents who use sign language (Brodbar, 2004), particularly when oral means of communication were not successful (Greenberg & Kusche, 1989). These factors may subsequently lead to externalizing disorders.

Interestingly, even though hearing parents of deaf children were just as likely to practice a variety of parenting approaches as hearing parents of hearing children, they were significantly less likely to be involved with their deaf children (Brubaker & Szakowski, 2000). This parent involvement was measured by asking their child about their day, plans for the day, and about their friends. This finding may reflect impaired parent-child communication due to restricted auditory access and is consistent with other findings regarding limited parent-child communication reciprocity (Harrigan & Nikolopoulous, 2002; Spencer, 2004). However, given the opportunity to properly adapt parenting skills and practices, more positive parent-child relationships may emerge (Raya, Ruiz-Olivares, Pino, & Hernuz, 2013; Sams, 2012; Woodgate et al., 2015).

While deaf children are already more likely to exhibit inattention, executive functioning deficits, and poorer language development than their hearing peers (Barker et al., 2009; Hall et al., 2016; Quittner et al., 2010; Van Eldik et al., 2004), additional risk factors that stem from the lack of environmental accommodations to the lack of or limited auditory access are unique to deaf children. Considering that the nearly all deaf children have parents who are hearing (Mitchell & Karchmer, 2004) where access to spoken communication or auditory mediated communication is likely to be a major barrier, the course of the deaf child's language development is expected to be

uncertain (Hall, 2017; Lederberg, Shick, & Spencer, 2013). Parent-child dynamics appear to be an important predictor of how a child may thrive in other settings. For example, deaf children are more likely to be bullied, teased, and experience rejection by their peers at school, especially if they have struggled to effectively express themselves with parents at home (Fellinger et al., 2009).

Parent-child communication. There are some findings regarding the frequency of parent-child communication. A study found that deaf children with lower language ability were associated with reduced frequency of parent-child communication (Barker et al., 2009). However, there were no association between behavior problems in deaf children and fewer counts of parent-child communication (Barker et al., 2009). These findings suggest that while hearing parents may be less motivated to talk to their deaf children when their language skills are lagging, a factor other than the quantity of parent-child communication, such as the accessibility and the quality of parent-child communication, may better explain and predict behavior in the deaf children. Unfortunately, studies that specifically assess the quality of parent-child communication and its role in language ability and behavior in children are lacking.

Since studies on the quality of parent-child communication among hearing parents of deaf children are lacking, effective parent-child communication is the only and best predictor of positive development in deaf children across all life domains to date (Marshchark, 2007). More recent studies on modes of communication suggested that effective communication – mutually understood exchanges of information between two or more individuals – is more important than the type of communication modality and increases the likelihood of optimal development in deaf children and adolescents (Kushalnagar, Topolski, Schick, Edwards, Skalicky, & Patrick, 2011). Generally, a shared language or communication system in the family is a fundamental *first step* in promoting a sense of cohesiveness among family members (Kluwin & Gaustad, 1991). Yet, effective communication does not exist without ensuring accessibility to communication. This is why auditory access is necessary for accessible and thus, effective communication for deaf children with hearing parents in a home that utilizes spoken communication.

Despite strong evidence of the likelihood of poor outcomes in deaf children with hearing parents, the specific effect that parent-child communication has on language development, executive functioning, TOM, problem-solving skills, and social-emotional development in deaf children is unknown at this point. For example, one study found that good language ability among deaf children did not immediately translate into good communication skills (Netten et al., 2015). This suggests that instilling social and functional communication skills in deaf children is also a necessary and crucial aspect that needs to be addressed since growing up in an environment that is unaccommodating to limited auditory access can lead to the inconsistent acquisition of skills that are necessary for optimal development.

Interventions to Address DBDs Among Deaf Children

Despite findings from the literature suggesting that challenges in parent-youth relationships due to access to communication have a widespread effect on domains critical to social-emotional development in deaf children, empirically-supported interventions for families of hearing parents with deaf children and adolescents are sparse. Findings from Parent-Child Interaction Therapy (PCIT) (Eyberg, 1979), Promoting Alternative Thinking Strategies (PATHS) (Kusche & Greenberg, 1994), and Coping Power Program (Lochman & Wells, 1996) suggest some value in testing treatments that are already well supported with the general (hearing) population. These interventions will be briefly described, and the evidence for their efficacy in the deaf population reviewed.

PCIT is a parent-child intervention that intends to treat DBDs in young children by promoting a more positive parent-child relationship (Eyberg, 1979). The intervention is comprised of two phases: i) child-directed interaction (CDI) and ii) parent-directed interaction (PDI) (Eyberg, 1979, 1999). The CDI phase further increases the warmth of the parent-child relationship by showing parents how to provide positive attention to their child (e.g., narrating or describing the child's free play, producing reflections of child's verbalization, and labeled praises while ignoring negative behaviors) (Eyberg, 1988). The CDI lays the foundation for the PDI phase where the parent learns and practices discipline skills (e.g., providing clear instructions, praise, and

implementing time-out when necessary) (Eyberg, 1999). To date, two case studies reported on the use of PCIT with members of the deaf population. However, the two case studies that were examined were focused on a hearing child with deaf parents (Armstrong, David, & Goldberg, 2014) and a deaf mother with a deaf child (Shinn, 2013). Importantly, children aged three to eight years old represent the *average* range for the evidence base of PCIT (see Thomas, Abell, Webb, Avdagic, & Zimmer-Gembeck, 2017 for meta-analysis; Nixon, Sweeney, Erickson, & Touyz, 2003; Schuhmann, Foote, Eyberg, & Boggs, 1998) although some studies include children outside of the average range (e.g., as young as 1.5 years old) (Bagner, Sheinkopf, Vohr, & Lester, 2010).

Promoting Alternative Thinking Strategies (PATHS) is another empirically-supported universal social-emotional learning curriculum that has been tested with older deaf children (aged 5 to 12 years old; 1st grade through 6th grade) (Greenberg & Kusche, 1993, 1998), but it is a school-based universal prevention program for elementary school students in either general or special education classes (Kusche & Greenberg, 1994). The one-year program is delivered by classroom teachers and school counselors to reduce aggressive and disruptive behaviors while promoting social and emotional skills. General education teachers were trained to use PATHS when working with students to promote emotion awareness, emotional regulation, and social problem-solving skills. Deaf students who received PATHS demonstrated significant increases in reading achievement, understanding one's emotions, performance in problem-solving, and frustration tolerance, as well as decreased behavioral impulsivity when compared to deaf students who were not exposed to the PATHS program (Greenberg & Kusche, 1993, 1998). These gains were maintained two years following this curriculum. Even though there were no significant changes in behavioral problems in the classroom and at home, the authors noted that the children's behaviors were within normal limits prior to receiving the curriculum (Greenberg & Kusche, 1993, 1998).

The Coping Power Program (Lochman & Wells, 1996) is another intervention that focuses on diminishing risk factors for antisocial behavior in children by improving social cognition, self-regulation, relationships with peers, and parenting (The California Evidence-Based Clearinghouse for Child Welfare [CEBC], 2017). This program integrates the child and parent components with

34 group sessions for the child component and 16 sessions for the parent component (provided during the same time period as the child component). The child component emphasizes managing one's anger, problem-solving, and practicing skills to successfully refrain from succumbing to peer pressure. The parent component promotes positive involvement and consistency in discipline and supervision. The efficacy of the Coping Power Program was tested on deaf children with aggression at a residential school (Lochman et al., 2001). Since deaf children only went home on the weekends, the study involved teachers and dormitory staff in the intervention instead of their parents. Findings from this study revealed that while the aggression and conduct problems of deaf children receiving the intervention did reduce compared to the control group, but this improvement was not sufficient to be significant. Still, deaf children who received the intervention significantly improved in their total competence communication and generating competent solutions compared to the control group (Lochman et al., 2001).

To summarize, there is some promising evidence of the utility of interventions developed for and tested with the general population to be generalized to the deaf population. Because PCIT is only for young children, PATHS is a school-based intervention, and the Coping Power Program is quite lengthy with no sessions where their parents and children can practice their skills with each other, there is room for additional interventions to be tested on deaf children with disruptive behavior disorders, particularly those that focus on communication challenges, which are purported to be critical to parent-child interactions and relationships. Additionally, because an increase in problem-solving performance appeared to reduce behavior problems and impulsivity in deaf children, promoting collaborative problem-solving between the parent-child dyads may produce a similar effect with the added benefit of enhanced parent-child relationships.

Collaborative Problem Solving/ Collaborative & Proactive Solutions (CPS)

CPS (Greene, 1998) operates on a cognitive-behavioral psychosocial framework of the transactional model (Sameroff, 1975). CPS meets the criteria for "probably efficacious" treatment, which means that two randomized controlled trials have been conducted with the general population, but both done by the same investigator teams. The transactional model emphasizes

compatibility between environmental characteristics across families, teachers, peers, neighborhoods, and children as opposed to parenting *or* child deficits (see Greene, 2010, e.g., Sameroff, 1975). In this model, disruptive problem behaviors are theorized to arise when there is a mismatch between an environmental demand and a child that has difficulty meeting it due to lagging skills (Greene, 2010). The CPS approach emphasizes the message of "skill not will" when working with parents of children who are disruptive. In this approach, the clinician collaborates with the parent to identify which of the five lagging skills are commonly lacking in their child: Language and Communication, Executive Skills, Emotion Regulation Skills, Cognitive Flexibility Skills, and Social Skills (Greene & Ablon, 2006). These lagging skills in combination with certain environments or events lead to disruptive behavior or poor adaptive functioning in children.

In addition to learning about lagging skills as a precursor to behavior problems rather than malicious intent, parents also learn about how to break down parenting discipline into three approaches: Plan A, Plan B, and Plan C (Greene & Ablon, 2006). Plan A takes place when the parent effectively places a demand and the child successfully complies. Plan C is when a parent places a demand only to have the child act out, and the parent drops the demand as a result. The goal of this treatment is to get parents to practice more of Plan B, which consists of three crucial steps: provide empathy, concerns are shared from the child and the parent, and then collaboratively problem-solve. The CPS approach is highly individualized, yet the structure of the approach remains the same, providing ease and consistency for parents and children who are learning to practice this on a regular basis. The benefit of the CPS approach is its focus on training and fostering skills in children with behavior problems who also have lagging skills. As a result, it improves functioning in addition to reducing problematic behavior (Becker, Chorpita, & Daleiden, 2011).

The first randomized controlled trial tested the effectiveness of CPS compared with Parent Management Training (PMT) with 47 children who met the full diagnosis for ODD and who had symptoms of juvenile bipolar disorder and/or major depression (Greene et al., 2004). Additionally, many of the children also met the subthreshold for conduct disorder (CD). Following enrollment

in the study, the children were randomized into either the CPS or the PMT condition. Outcomes were measured at baseline, following treatment, and at four months after treatment. For the CPS condition, ODD frequency and severity according to the DSM-IV criteria, parental stress, adaptive functioning, and parent-child relationship were significantly improved at post-treatment as well as at four-month follow-up. While both groups produced a large effect size from pretreatment to post-treatment, but only the treatment group maintained this large effect size from pre-treatment to four-month follow-up; the PMT condition's effect size was moderate at four-month follow-up. Parenting stress were not significantly different between groups over time. However, the CPS condition demonstrated improvements in parent and child relationship over time whereas this relationship declined in the PMT condition over time. Finally, 80% of the children in the CPS condition displayed significant global improvements (as reported by their mothers and therapists) whereas this improvement was only seen in 44% of the children in the PMT condition (Greene et al., 2004).

The second randomized control trial compared the effectiveness between three groups: CPS, Parent Management Training (PMT), and a waitlist control group with a total of 134 children from 7 to 14 years old (Ollendick et al. 2016). All child participants met the full criteria for ODD, and had a variety of comorbid disorders, with anxiety and ADHD being the most common. Outcomes were assessed at baseline, following treatment, and six months after treatment. Findings indicated that both active conditions demonstrated significant reductions in ODD severity, global clinical severity, ODD symptoms, and aggression over the waitlisted control group from baseline to after treatment with maintenance of these treatment gains six months post-treatment. Clients in both conditions were satisfied with treatment, and their level of satisfaction were also maintained at did not differ at post-treatment and at 6-month follow-up. Additionally, the amount of children who no longer met the criteria for ODD in the PMT and CPS conditions at post-treatment were comparable (48.8% and 48%, respectively) (Ollendick et al., 2016). Finally, children with a comorbid disorder of anxiety demonstrated greater response to treatment and younger children were more responsive to the two treatment conditions over time than older children (Ollendick et

al., 2016). Several studies have been published following the second randomized control trial with additional results from data analyses that were not conducted in the Ollendick et al. (2016) study. For one, children with higher ratings of their relationship with their parents at pre-treatment demonstrated a greater response in both of the two treatments (CPS and PMT) (Booker, Ollendick, Dunsmore, & Greene, 2016).

Summary

Review of the literature indicates that while deaf children face a similar risk of experiencing coercive cycles as their hearing peers, deaf children (depending on the extent of their auditory access) of hearing parents who use spoken language to communicate are at a greater risk of experiencing coercive cycles due to poor environmental fit. Thus, deaf children of hearing parents may be more likely to develop DBDs. Because of the deaf-specific experiences as described above, the CPS approach, which involves problem-solving and skill-building of identified lagging skills, including lags in language and communication, may be a particularly appropriate fit for addressing DBDs in deaf children. Additionally, the CPS approach directly addresses the information deprivation issue from the lack of or restrictive incidental learning that is likely to contribute to lagging skills in deaf children (which manifests as DBDs) by providing deaf children the opportunity to learn skills through explicit coaching from their parents. Finally, CPS approach aligns with the COM-B framework for promoting behavior change by providing deaf children with opportunities to build their lagging skills, increasing motivation by repeated collaborative attention from parents, and—as they continue to have more opportunities to build their lagging skills—increasing their capability due to possibly experiencing success from trying out solutions that were established during problem-solving conversations with parents.

Current proposal. The purpose of the current study proposal is to test the efficacy of the Collaborative Problem Solving (CPS) approach in reducing aggression, ODD severity, disruptive behavior, and ODD symptoms in deaf children with hearing parents. The study proposal also aims to evaluate how CPS may improve child-reported relations of deaf children with their hearing

parents. Facilitators and barriers to treatment efficacy and client satisfaction will also be assessed to guide future intervention research.

Chapter 3: The Proposed Study

Research suggests that CPS reduces ODD symptoms in children, a systematic replication of the Ollendick et al. (2016) study will help determine whether CPS also contributes to the reduction of ODD symptoms in an untested population, deaf children (ages 7-14) with hearing parents. The proposed study is a randomized clinical trial comparing CPS to waitlist control as an intervention for hearing parents and deaf children who meet the criteria for ODD, even if it is a primary, secondary, or a tertiary diagnosis.

Research Questions and Hypotheses

Research Question 1: After controlling for child and parent demographics, characteristics, and outcome measures at baseline, to what extent does CPS effectively treat ODD in deaf children with hearing parents?

Hypothesis 1: *After controlling for the deaf children's and parents' demographics, characteristics, and outcome measures at baseline, the treatment condition group will demonstrate significant declines in ODD severity, aggression, disruptive behavior, and ODD symptoms whereas the waitlisted control group will exhibit no significant declines in ODD severity, aggression, disruptive behavior, ODD symptoms.*

Research Question 2: After controlling for child and parent demographics, characteristics, and outcome measures at baseline, to what extent does CPS improve deaf child-reported relations with their hearing parents?

Hypothesis 2: *After controlling for deaf children's and hearing parents' demographics, characteristics, and outcome measures at baseline, the treatment group will demonstrate significant improvements in deaf children's reported relations with their hearing parents over time whereas the waitlisted control group will exhibit no significant improvements in the deaf children's reported relations with their hearing parents over time.*

Research Question 3: After controlling for child and parent demographics, characteristics, and outcome measures at baseline, to what extent does the deaf child's auditory access moderate the relationship between CPS and treatment outcomes?

Hypothesis 3A*: After controlling for child and parent demographics, characteristics, and outcome measures at baseline, an increase in auditory access will be associated with declines in ODD severity, aggression, and disruptive behavior for deaf children in the treatment group at post-treatment. There will be no significant relationship between auditory access and ODD severity, aggression, and disruptive behavior in the waitlisted control group at post-treatment.*

Hypothesis 3B: *Additionally, there will be a significant difference in ODD severity, aggression, and disruptive behavior at post-treatment between the treatment and the waitlisted control groups for deaf children with high and medium levels of auditory access, but there will be no significant difference in ODD severity, aggression, and disruptive behavior at post-treatment between groups for deaf children with low levels of auditory access.*

Research Question 4: After controlling for parent and child demographics, characteristics, and outcome measures at baseline, to what extent is CPS viewed as an acceptable treatment for hearing parents with a deaf child?

Hypothesis 4: *The majority of the completers in the treatment condition will report high treatment acceptability at post-treatment, and this rate of acceptability will be at least maintained at 6-months follow-up.*

Chapter 4: Methodology

Participants

For the current study proposal, the target population is 158 deaf children (ages 7-14) and their hearing parents living in the northeast region of the United States. This region was chosen because this is where the CPS headquarters are located.

Inclusion Criteria. Children will be eligible for the study if the following criteria are met: Deaf or hard-of-hearing as a primary disability in schools records, unaided mild hearing loss (ranging from 21 to 40dB) moderate to profound hearing loss (unaided or aided ranging from 41 to 91+ dB) (Clark, 1981), spoken English is the deaf child's and the hearing parent's primary mode of communication at home (to reduce the variability of findings if there is a mismatch in language used between the parent and child), and Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-IV C/P) (Silverman & Albano, 1996) results indicate that the deaf child meets the full Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association, 1994) criteria for ODD (even if ODD is the deaf child's primary, secondary, or tertiary diagnosis).

Exclusion Criteria. Families will be excluded from the study if any one of the following criteria is met: youth non-verbal IQ less than 70, youth's primary disability is other than deaf or hard-of-hearing (according to the child's IEP records), meets diagnostic criteria for the following conditions: Conduct Disorder, Autism Spectrum Disorder, a psychotic disorder, Intellectual Disability, or currently experiencing suicidal or homicidal ideation; at least one parent is deaf or hard-of-hearing; if the family is currently in receipt of treatment elsewhere; and if the child's speech and auditory abilities are below the cut-off score.

Procedures

Recruitment plan. Multiple recruitment strategies will be utilized to recruit parent and youth dyads in Boston, Massachusetts. Since parents frequently see their child's pediatrician for behavior problems, recruitment information will be sent out to local hospitals, primary care

facilities, and mainstreamed programs. Interested hearing parents with deaf children will call the phone number listed on the flyer.

Randomization and enrollment. All eligible parent-child dyads will be randomized to increase the odds of ruling out additional confounding factors such as a selection bias. First, interested families will contact a designated staff member who has been trained by the primary investigator to provide initial screening. The initial screening will include confirmation that the referred child is deaf and the primary caregiver is hearing as well as instruct the parent-child dyad to bring the required documents (i.e., deaf child's IEP documents and audiological records) to their first in-person screening meeting. Second, parent-child dyads who pass the initial screening over the phone will be instructed to meet at the Think:Kids Clinic located at the Department of Psychiatry at Massachusetts General Hospital to discuss the purpose of the study and receive formal informed consent and youth's assent before administering the Colorado Individual Performance Profile (CIPP) form and reviewing IEP documents along with the deaf child's audiological records. Third, if the child meets all of the inclusion criteria and does not meet any of the exclusion criteria, the outcome assessors or clinicians who are research assistants, graduate students, or postdoctoral fellows associated with the Think:Kids center will administer a battery to the deaf child. The battery will consist of measures that capture the deaf child's receptive and expressive language, nonverbal intelligence, and auditory access. Fourth, if the child continues to meet the inclusion criteria without meeting any of the exclusion criteria, the Anxiety Disorders Interview Schedule, Child/Parent Version (ADIS-IV C/P) (Silverman & Albano, 1996) will be administered. Fifth, if the child fully meets criteria for ODD, and therefore, all of the inclusion criteria and none of the exclusion criteria, the participants will undergo baseline evaluations by completing the Behavior Assessment System for Children, 2nd Edition (BASC-2) (Reynolds & Kamphaus, 2004) and the Disruptive Behavior Disorders Rating Scale (DBDRS) (Barkley, 1997c; Pelham, Gnagy, Greenslade, & Milich, 1992). At the sixth step, the parent and the child will go through a re-consenting procedure where they will meet with the principal investigator to answer their questions about the study and ensure their understanding of the possibility of having to accept

randomization to the waitlisted control group. Once the informed consent and assent forms have been re-obtained from primary caregivers and their child, a designated staff member of the study (not one of the clinicians or outcomes evaluators) will collaborate with a professional at a randomization center who has no knowledge of the eligible study participants' identities over the phone to reduce selection bias. The staff member will share names from the list in order of which the deaf children who have completed all the necessary assessments and are awaiting randomization. Each deaf child will be randomly allocated through computer-generated random numbers. Finally, the first CPS session will follow randomization, which will be after an approximately 2-3 week waiting period.

Treatment. Two deaf licensed psychologists trained in CPS will be consultants for the CPS therapists throughout the treatment condition period. Like the Ollendick et al (2016) study, all eight therapists and deaf consultants, who are doctoral students or postdoctoral fellows associated with the Think:Kids center, will receive CPS training prior to the study and will receive supervision with Dr. Greene via teleconferencing for 75 minutes each week. CPS consists of four treatment components: (i) identify lagging skills and unsolved problems that trigger oppositional behaviors, and provide psychoeducation to parents regarding how their responses to such behaviors may result in escalation or maintenance of their child's oppositional behavior; (ii) prioritization, where the process of prioritizing unsolved problems to focus on will be prioritized during the problem-solving meetings with parents; (iii) introduce the Plans framework to parents – three main ways to solve problems: Plan A (unilateral problem solving, delivered by adult imposition of will which often comes with consequences determined by the adult); Plan B (problem solve proactively *with* the child); and Plan C (momentarily refrain from addressing the problem) and (iv) implementing Plan B where parents and their children develop skills and master Plan B and refrain from using Plan A predominately (Ollendick et al., 2016 , p. 596). The therapists' role in the CPS condition is to first guide the problem-solving process and then encourage the parents and their children to independently and effectively problem solve together. CPS will be delivered in 12, 75-minute sessions with one booster session two weeks after the last

session, adding up to a total treatment period of approximately 14 weeks (see Ollendick et al., 2016). Both parties, the child and their parent, will be involved in each session to increase the chances of at-home implementation of skills learned in the previous session by both parties.

Data collection. Outcome measures from the dyads will be collected at three time points: pre-treatment for baseline, post-treatment for treatment effects, and then at least six months after the intervention has ended for evaluating the maintenance of treatment effects (Flay et al., 2005). Families will be provided a 50 dollar stipend for each assessment completed, which means they have the opportunity to earn up to $150 if all three assessments are completed.

Since the participants and clinicians providing the treatment could not be masked to treatment assignment, all outcome assessors will be masked to treatment assignment when conducting outcome measures at all three time points. For each parent-child dyad, two assessors (total of 12 assessors) will be assigned to administer outcome measures. All outcome assessors will be trained to increase the reliability and validity of collecting the data, and no outcome assessors will be assigned as therapists for the dyads they evaluated. Consensus on primary, secondary, and tertiary diagnoses determined from separate results of the ADIS-C and ADIS-P (Silverman & Albano, 1996) will be reached in weekly meetings between two assessors and a supervisor of the diagnostic assessments (Ollendick et al., 2016). Additionally, all FLEs will be video recorded for the purposes of checking the scoring accuracy of the CAP-II. The lead Speech and Language Pathologist (SLP) to randomly select and review 20% of the FLEs done by each of the 12 SLPs. Furthermore, the participants will be notified at post-test (one-week following treatment) and reminded again at 6-months follow-up to not disclose their treatment assignment. All data will be compliant with the Institutional Review Board guidelines to preserve participants' confidential information. For more information on data collection timelines, please see Appendix B.

Families who drop out of the treatment group will be contacted by a designated member of the research team through phone, email, or mail to inquire reasons for discontinuing treatment (see Appendix C) (Vickers, 2017). To minimize a high rate of non-responders, a 25 dollar stipend will

be offered as an incentive to complete and return the non-completers survey. This same strategy will be utilized to collect 6-months follow-up outcome data from families who have dropped out from the study. However, if the attempts to reach the parent-child dyads are unsuccessful, the last observation carried forward approach (intent-to-treat [ITT] analyses) will be utilized.

Variables and Measures

The following child and parent demographic and characteristic measures will be administered to the child according to the preferred mode of communication reported by the child's primary caregiver on the CIPP, IEP documents, and audiological records. The child's mode of communication is defined as the mode that the child is the most fluent in and is seen using across at least two settings for the majority of the time. A direct measure, as opposed to reports of the deaf children's range of accessibility to the mode of communication, will allow for a more accurate understanding of how their range of accessibility affects treatment outcomes, and strengthen the internal and external validity of the study. For the purposes of the current proposal study, results from the analyses of the deaf children's auditory access serves several purposes: (i) a characteristic of the child; (ii) utilized as a controlled variable for the first research question and analysis; (iii) utilized as a moderator variable. A brief list and summary of the key variables and measures are provided, below. More detailed information and sample items are included in the appendix A.

Child and Parent Demographics and Characteristics (prior to treatment randomization). The Colorado Individual Performance Profile (CIPP) (The Colorado Department of Education Special Education Services, 2002) is a multipurpose tool used to collect background information on deaf children. The deaf child's primary caregiver will be responsible for completing this demographic questionnaire.

Nonverbal Intelligence (prior to treatment randomization). The Leiter-R Nonverbal IQ Screener (Roid & Miller, 1997) will be administered to all deaf children eligible for the study. For the purposes of this study, only a component of the Leiter-R test, the Leiter Brief IQ screener (Roid & Miller, 1997) will be used to obtain am approximation of general intellectual functioning without the influence of language.

Auditory Access (prior to treatment randomization). The Categories of Auditory Performance (CAP) (Archbold, Lutman, & Marshall, 1995) measure is commonly used in research and to inform professionals and parents across the globe on how much their deaf child is able to access sound-based information (e.g., recognize environmental and speech sounds). The CAP-II (Gilmour, 2010) expanded from a seven-point scale to a nine-point scale to avoid ceiling effects. This single-item scale ranges from zero ("no awareness of environmental sounds") to nine ("use of telephone with an unknown speaker in an unpredictable context") (Gilmour, 2010) with higher scores indicating higher auditory access. For the current study proposal, this will be used as a final score following the Functional Listening Evaluation (FLE) (Johnson & Von Almen, 1993) administered and scored by two speech and language pathologists (SLPs) who are a part of the research team.

Receptive Language (prior to treatment randomization). The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4) (Dunn & Dunn, 2007) is a norm-referenced, individually administered, and wide-range test to capture the receptive lexicon of individuals (ranging from 2 years and 6 months to 90 years old and up) in English across 20 content areas (e.g., vegetables, actions, etc.) (Dunn & Dunn, 2007).

Expressive Language (prior to treatment randomization). The Expressive Vocabulary Test, Second Edition (EVT-2) (Williams, 2007) is a norm-referenced, individually administered, and a wide-range test that assesses both expressive lexicon and word retrieval in individuals (ranging from two and half to 90 years old and up) who use spoken English (Williams, 2007).

Treatment non-completer survey (any time during the course of treatment). This brief treatment non-completer survey with three items (see Appendix C) will help clarify the participants' reasons for leaving the study. This adapted measure from Vickers (2017) study will provide a more nuanced understanding when interpreting attrition results.

ODD severity (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-C/P) (Silverman & Albano, 1996) is a semi-structured diagnostic interview to

aid in the identification of nearly all psychiatric disorders among minors. A clinician severity rating (CSR) is developed according to the interference ratings on a nine-point scale which are determined from symptoms that the clinician assesses in the interview along with the collection of relevant information such as the frequency and intensity of the symptoms (Silver & Albano, 1996). Receiving a CSR of four or higher on a zero to eight scale reflects a psychiatric diagnosis. As it was done in the Ollendick et al. (2016) study, the CSR will be used as the outcome variable.

Aggression (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Behavior Assessment Scale for Children – 2nd Edition (BASC-2) (Reynolds & Kamphaus, 2004) assesses feelings, behaviors, and perspectives in minors. Like the Ollendick et al. (2016) study, only the Aggression scale from the Parent Rating Scales (PRS) will be reported.

Child-Reported Relations with Parents (prior to treatment randomization, one-week post-treatment, and at 6-month follow-up). The Behavior Assessment Scale for Children – 2nd Edition (BASC-2) (Reynolds & Kamphaus, 2004) assesses feelings, behaviors, and perspectives in minors. As it was in the Booker et al. (2018) study (a follow-up study of the Ollendick et al., 2016 study) only the 11-item Relations with Parents of the Self-Report of Personality (SRP) form will be of primary interest.

ODD Symptoms (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Clinical Global Severity and Improvement (CGI-S and CGI-I) (Guy, 1976) provides a brief, independent, and subjective assessment from the clinician's perspective of the child's overall symptomatic impairment (Busner & Targum, 2007).

Disruptive Behavior (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Disruptive Behavior Disorders Rating Scale (DBDRS) (Barkley, 1997c; Pelham, Gnagy, Greenslade, & Milich, 1992) is a scale that assesses ODD, CD, and ADHD symptoms based on the DSM-IV. A score of a four or above on the eight symptoms listed under ODD indicates possible ODD. Like the previous study, this measure will be completed by the primary caregivers at each assessment point (Ollendick et al., 2016).

Treatment Satisfaction (one-week post-treatment and at 6-months follow-up). The Client Satisfaction Questionnaire (CSQ-8) (Attkisson, 2012; Attkisson & Zwick, 1982) is a four-point Likert scale that consisting of eight items, with separate forms for adolescents and their caregivers. Only the caregiver forms are of primary interest for the purposes of this current study proposal. Higher scores indicate greater satisfaction with treatment.

Treatment Fidelity. The initial study (Ollendick et al., 2016) utilized a 6-item checklist with half of the items focused on prescriptive, and the remaining half focused on proscriptive. Their reasons for including both prescriptive and proscriptive items was to make sure that the therapists in their respective treatment assignments (CPS vs. PMT) focused on their assigned treatment approach (prescriptive) and limited crossover in therapeutic strategies (proscriptive). Since this study does not have another treatment arm (e.g., PMT), only the prescriptive items will be used in the proposed study. Like the initial study (Ollendick et al., 2016), all sessions will be video-recorded for the supervisor to review and complete a three-item checklist. A sample item is "therapists instructed parents on three potential response options for dealing with their child's behaviors and helped them implement Plan B strategies (e.g., how to solve problems collaboratively taking into consideration identifying lagging skills in the child)" (Ollendick et al., 2016, p. 598). A treatment fidelity score of 3 represents the maximum possible score.

Covariates. For the first and fourth research question, a total of fifteen covariates for each research question will be: sex, age, auditory access, receptive language, expressive language, nonverbal intelligence, race/ethnicity, SES, the amount of additional disabilities (other than deafness), child-reported relations with parents at pre-treatment (Booker et al., 2016). The outcome measures at baseline that are significantly different between groups will also be included as covariates. The same covariates, except for child-reported relations with parents at pre-treatment will be included for the second research question. For the third research question (moderation analyses), since there will be two predictors (auditory access and group assignment), thirteen covariates, instead of fifteen, will be included in the analyses. With the exception of auditory

access (since it is already included as a predictor), the covariates for the moderation analyses will be the same as the ones listed above (for the first and fourth research questions).

Design Considerations

Comparison group. This study proposes a systematic replication of Ollendick, et al. (2016) to evaluate the efficacy of CPS on an untested population: deaf youth with hearing parents. The Ollendick et al. (2016) study compared the efficacy of CPS to Parent Management Training (PMT) and a waitlist control group on treating youth with ODD. This previous study was conducted by examining results from measures administered at pre-treatment, post-treatment, and 6-month follow up. Systematic replication studies typically consist of at least one to several modifications due to a different set of investigators, targeted populations or samples, and so forth (Kazdin, 2003). Such modifications from the previous study to the current proposed study refer to testing CPS as a treatment on a different sample conducted by a different set of investigators and treatment clinicians. Since access to communication and information is a central factor in relationship building among deaf individuals, parent-child communication will also be included as an eligibility criteria; hence, evaluated prior to study enrollment.

Additionally, only one other group, a waitlisted control group, will be utilized as opposed to comparing CPS against another treatment approach (PMT, in the case of the previous study). The previous study's rationale for including PMT as an additional comparison group in their study was because PMT is the "gold standard" treatment with the most empirical support for youth with externalizing behaviors (e.g., ODD, ADHD, etc.) (Eyberg, Nelson, & Boggs, 2008; Murrihy, Kidman & Ollendick, 2010; Ollendick et al., 2016). The purpose of this initial intervention efficacy study is to demonstrate the benefit of CPS for deaf children with hearing caregivers relative to the current standard of care. Because there is no well-established treatment for deaf children with externalizing disorders, a comparison to no treatment is a logical first step; a next step will be to compare CPS to a well-tested intervention such as PMT. Adequate power for three conditions, as in the Ollendick et al. (2016) study, would also be challenging given the low base rates of deaf children.

Additionally, directly measuring deaf children's auditory access will help determine the role accessibility plays in treatment outcomes of CPS by controlling for this variable as well as accounting for it in the moderation analysis.

Chapter 5: Statistical Analyses

While hierarchical linear modeling (HLM) would be the ideal statistical analysis approach for this study proposal because there are multiple measurements per subject, the investigator has not received training or exposure to HLM. For this reason, two sets of two-way mixed (one between-subjects and one within-subjects) repeated measures Multivariate Analysis of Covariance (MANCOVAs) will be conducted to determine the extent of which CPS effectively treats ODD in deaf children with hearing caregivers.

Preliminary Analyses

The current study proposal will adopt an intent-to-treat analysis approach only if the outcome data at post-treatment and at 6 months follow up are not available following attempts to collect the outcome data. The main reason for including all data from participants who were randomized in the final analysis regardless of follow-up or receipt of study intervention is to reduce bias of treatment differences.

Descriptive statistics of the participants' demographics, characteristics, and outcome measures at baseline will be reported. Additionally, to determine whether randomization was effective, child and parent demographics, characteristics, and outcome measures at baseline data will be analyzed between the treatment and waitlisted control groups (one-way Analysis of Variances [ANOVAs]) for continuous variables and Chi-Square analyses for categorical variables. If outcome measures at baseline are significantly different between groups, these variables will be included in the primary analyses as covariates along with child and parent demographics and characteristics. Additionally, if participants were excluded from the study, reasons for exclusion will be discussed.

Treatment Fidelity. To determine whether the CPS therapists focused on the prescribed treatment aspects for most of the time, the mean number of the three prescriptive items will be calculated and reported (Ollendick et al., 2016).

Inter-rater Reliability. Regarding ADIS-C/P diagnoses, the Cohen's Kappa will be used to determine the inter-rater reliability for agreements on each of the primary, secondary, and

tertiary diagnoses. Kappa coefficients the for each of the three diagnoses will be reported (Ollendick et al., 2016).

For measuring agreements on auditory access, intraclass-coefficients (ICCs) will be reported using the two-way mixed model and absolute agreement (Hallgren, 2012). Specifically, ICCs for each pair of raters in addition to the average of all ICCs for each pair of raters will be reported.

ODD Diagnosis Status. Prior to assessing diagnostic status for ODD specifically, all the proportion for each primary, secondary, and tertiary diagnoses of the entire sample will be reported. As previously done in the Ollendick et al. (2016) study, the frequency and percentage of deaf children who no longer meet the criteria for a clinical diagnosis of ODD (this requires a CSR score of 3 or lower) at each assessment time point: pre-treatment (after group assignment), post-treatment, and at 6-month follow-up will be reported. In addition, the two-sample proportions test will be conducted and reported to determine whether there is a significant difference between groups at each time point.

Attrition. The number of participants initially assigned to each group will be reported along with the amount and percentage of non-completers (defined as completing six or fewer treatment sessions) and completers (defined as completing seven or more treatment sessions) (Ollendick et al., 2016, p. 597). The reason for this completer status criterion is because all the CPS strategies will have been introduced to the parent and the child within seven sessions and the remaining sessions will be focused on polishing skills acquired from previous sessions. The mean and standard deviation will be calculated and reported for the completers to note the approximate number of treatment sessions most completer dyads were seen for.

Because it is known that the characteristics and demographics of participants who end up dropping out from a study may be different from those who remained in the study (Bankhead, Aronson, & Nunan, 2017; Dumville, Torgerson, & Hewitt, 2006), chi-square analyses and one-way ANOVAs will be conducted within the treatment condition to determine whether there was a

difference between completers and non-completers on child and parent demographics, characteristics, and outcome measures at baseline.

The number of dyads who completed treatment will be reported along with the number of those who completed the post-treatment assessment and those who completed the 6-month follow-up assessment. Explanations provided by participants for not completing post-treatment and/or 6-months follow-up assessments will be shared. Pre-treatment differences in parent and child characteristics, demographics, and outcome measures at baseline will be assessed with independent t-tests (for continuous variables) and chi-square analyses (for categorical variables) to determine whether there is a difference in characteristics between the assessment completers at post-treatment with the assessment completers. This analysis will be repeated to compare those who did not complete assessment at 6-month follow-up with those who did complete assessment at this time point.

Missing Data. As previously mentioned, the last observation carried forward method will be applied if outcome data from post-treatment and at 6-month follow-up could not be obtained. Little's test will be conducted to identify what data is missing completely at random and multiple imputations will be used to handle missing data.

One Between-Subjects and One Within-Subjects Analyses

Preliminary Analysis for Two-Way Mixed MANCOVAs. Prior to interpreting the results of the analysis, the assumptions of a two-way mixed MANCOVA will be examined. The linear relationships between each pair of dependent variables as well as between the covariate and each dependent variable within each group of the independent variable should be present. This linearity assumption will be tested with scatterplots. The homogeneity of regression slopes will be tested by adding interactions of each covariate with each factor to the model and testing for significance. The homogeneity of variance-covariance matrices assumption will be examined using the Box's M test of equality of covariance. An investigation of the standardized residuals will help rule out univariate outliers whereas the multivariate outliers will be determined by calculating the Mahalanobis distance values. Since multivariate normality (the normality of the

residuals for each dependent variable for each group of the independent variable) cannot be directly tested in SPSS statistics, testing for univariate normality by applying Shapiro-Wilk tests will be conducted as this is the next best approach to estimating whether there is multivariate normality (Stevens, 2002). The Shapiro-Wilk tests will examine each combination of the grouping (between-subjects) and time (within-subjects) factor levels (Razali & Wah, 2011). Additionally, the Box's M test will test the assumption that the variability in the dependent variable is equal across groups (between-subjects). Finally, the Mauchly's Test of Sphericity will be assessed to determine whether the variability of differences in repeated measures is equal across all levels of the within-subjects factor.

A list of Research Questions and hypotheses were provided on pages 29-31. Due to space considerations, they will only be numbered here.

Research Question 1. Due to more than one respondent (parent and clinician) two sets of a two-way mixed MANCOVAs. Since the dependent variables of the two sets of two-way mixed MANCOVAs are related, an alpha of .025 will be used to keep the Type I error rate to .05.

Clinician-Reported Outcome Measures Analysis. First, a two-way mixed repeated measures MANCOVA will be conducted to examine whether differences are present on the clinician-reported outcome variables (deaf child's ODD severity [CSR from the ADIS-C/P] and the symptoms [CGI-S]) by group (treatment group and waitlisted control group) and time (pre-test, post-test, and 6-months follow-up) after controlling for child and parent demographics and characteristics and outcome measures at baseline. In other words, the main effect of group (between-subjects variable), the main effect of time (within-subjects variable) and the interaction of both variables (group and time) are examined. The test of the grouping variable (between-subjects) main effect will detect whether there are significant differences between groups on the deaf child's ODD severity and symptoms, regardless of time. The test of time (within-subjects variable) will determine if the child's ODD severity status and symptoms significantly change over time, regardless of group membership. Finally, the test of the interaction effect will identify whether there are significant changes over time on the deaf child's ODD severity and symptoms

dependent on group membership (Pagano, 2009). A series of F-tests will be applied to establish if the main effects and interaction are significant at an alpha level of .05. For significant multivariate results, univariate results will be examined. If the treatment group variable is significant, this means that the treatment group is significantly different from the control group. Partial eta squared for effect sizes will be reported.

Post-hoc analyses. Following a significant interaction, pairwise comparisons will be used to identify the difference of clinician-reported ODD severity and symptoms in deaf children between groups at each time point (at pre-test, post-test, and at 6-months follow-up). Then, another set of pairwise comparisons will assist with comparing differences over time within each group (treatment vs. control). However, if there is no significant interaction, and results indicate a significant treatment effect (between-subjects) then pairwise comparisons will be conducted to identify which group had lower overall means of ODD severity and symptoms in deaf children. Additionally, if there is no significant interaction and the results indicate a significant effect of time (within-subjects), pairwise comparisons will be conducted to identify whether ODD severity and symptoms decreased or increased over time. Note that Bonferonni corrections will be used for all pairwise comparisons.

Parent-Reported Outcome Measures Analysis. Another two-way mixed repeated measures MANCOVA will be conducted to assess whether differences exist on the parent-reported outcome variables (deaf child's aggression [BASC-2] and disruptive behavior [DBDRS]) by group (the treatment condition group versus the waitlisted control group) and time (pre-test, post-test, and at 6-months follow-up) after controlling for child and parent demographics and characteristics and outcome measures at baseline. The same analyses (including post-hoc analyses) that will be conducted for the clinician reported outcome measures will be done for the parent-reported outcome measures analyses.

Preliminary Analysis for a Two-Way Mixed ANCOVA. The assumptions of normality and homogeneity of variance and covariance matrices will be examined (Statistics Solutions, 2016). The Kolmogorov-Smirnov statistic and the Normal Q-Q plot (Pallant, 2007 as cited in

Statistics Soltuions, 2016) will be used to assess whether the dependent variable, child-reported relations with parents, is normally distributed at each level of the independent variable, grouping condition and time. The Levene's test will be used to determine the homogeneity of the variance (Statistics Solutions, 2016). The homogeneity of regression slopes will be tested by adding interactions of each covariate with each factor to the model and testing for significance. To establish the quality of equality of variances and covariances for each level of the within-subject variable, the Mauchly's Test of Spehricity will be reviewed (Leech, Barrett, & Morgan, 2008 as cited in Statistics Solutions, 2016).

Research Question 2. A two-way mixed Analysis of Covariance (ANCOVA) will be conducted to assess if mean differences occur on child-reported relations with parents by group (treatment condition and waitlisted control group) and time (pre-treatment, post-treatment, and at 6-month follow-up) after controlling for child and parent demographics, characteristics, and outcome measures at baseline. The main effect of time (within-subjects) will determine if the child-reported relations with parents are different at three points in time, regardless of group membership. The main effect of the grouping variable (between-subjects) will determine whether there is an overall mean difference in child-reported relations with parents between groups across the three time points. Then the main effect of time by group will be assessed to determine if the differences in child-reported means of relations with parents between groups are the same or different over time.

Post-hoc analyses. Following significant main effects for group and time, pairwise comparisons with a Bonferroni correction based on estimated marginal means will be conducted to assess the means associated with the main effects and help determine which group is showing overall higher or lower reported relations with parents and whether the cumulative mean of both groups are demonstrating a trend over time. For significant group by time interaction, two rounds of simple effects of pairwise comparisons with a Bonferroni correction based on estimated marginal means will be conducted. The first round of simple effects will help determine whether the child-reported relations with parents means differ across time in their respective groups: the

treatment group and the waitlisted control group. The purpose of the second round of simple effects is to identify whether the mean of child-reported relations with parents differs between groups at pre-treatment, post-treatment, and at 6-month follow-up.

Moderation Analyses

Research Question 3. To examine this research question, a moderation analysis (Aiken & West, 1991) will be conducted to assess if the deaf child's auditory access (as determined by the FLE) moderates the relationship between the grouping variable and each of the three outcome variables (deaf child's ODD severity, aggression, and disruptive behavior at post-treatment). This requires conducting three separate moderation analyses, totaling nine regression analyses. Since the three outcome variables are not independent of each other, a Bonferroni correction will be utilized, providing a new alpha at .017.

Deaf child's ODD severity. Since the deaf child's ODD severity variable is continuous, a multiple regression will be conducted. The independent variables of the multiple regression are the treatment condition variable and the deaf child's auditory access variable and the interaction between these two variables and the following covariates: parent and child demographics, characteristics, and outcome measures at baseline. The interaction term is created by multiplying the treatment condition variable and the deaf child's auditory access variable together after the continuous moderator (deaf child's auditory access) has been centered to its mean.

Post-hoc analyses. If the interaction effect is significant, then post hoc analyses of simple effects will be conducted by running three regressions at three different values of the moderator (i.e., high, average, low). The moderator variable will be centered around: 1) the mean of the moderator (medium auditory access); 2) the mean minus one standard deviation of the moderator (low auditory access); 3) the mean plus one standard deviation of the moderator (high auditory access) (Aiken & West, 1991). The simple slopes for the treatment condition variable will be looked at within the treatment group and the control group to identify whether there is a significant relationship between auditory access and the outcome variables. Note that this exact moderation

analysis process will be repeated for the other two outcomes: the deaf child's aggression and disruptive behavior.

Within-Subjects Analysis

Preliminary Analysis for a Repeated Measures ANCOVA. First, the skewness and kurtosis values will be evaluated to confirm whether the distribution of the dependent variable is normal. Second, the scatterplot will be assessed to determine whether the linearity assumption is met. Third, the homogeneity of regression slopes will be tested by adding interactions of each covariate with each factor to the model and testing for significance. Finally, the Mauchly's Test of Sphericity will be assessed to determine sphericity (Statistics Solutions, 2013).

Research Question 4. First, descriptive statistics will be conducted to report the frequencies of treatment acceptability rates in the treatment group at post-treatment and at 6-months follow-up. This will determine whether the treatment acceptability rates are adequate for an efficacy treatment trial. Second, because F-tests are not likely to be affected by the violation of the normality assumption (as previously discussed), the treatment acceptability variable will be treated as a continuous variable.

A repeated measures ANCOVA will be conducted to assess if mean differences exist on treatment acceptability by time (post-treatment vs. at 6-months follow-up) after controlling for child and parent demographics, characteristics, and outcome measures at post-treatment. It should be noted that if the hypothesis from the moderation analyses is supported, the child's auditory access variable will be included as a covariate.

Post-hoc analyses. Following significant differences between the two time points, the pairwise comparisons will be used to determine whether the treatment acceptability increased at 6-months follow-up. If the significant finding occurred because treatment acceptability had increased from post-treatment to 6-months follow-up, the hypothesis for this research questions continues to be supported. However, if the pairwise comparisons show that the change over time in treatment acceptability is attributed to the significant decrease from post-treatment to 6-months follow-up, this finding equates to failing to reject the null hypothesis.

Power Analysis

According to the a priori power analysis results from the G*Power 3.1 (Faul, Erfelder, Bucnhner, & Lang, 2014), at least 158 parent-child dyads is necessary for adequate power of .80 with a medium effect size of .25 and an alpha of .05 (Cohen, 1969). Note that because two-way mixed (one-between, one-within [repeated measures]) MANCOVA was not commercially available, the a-priori results were based on repeated measures MANOVA within and between groups to be conservative.

However, the sample size to do a moderation analysis to answer the fourth research question, power analysis was based on the linear multiple regression: Fixed model, R^2 increase. For a medium effect size (f^2) of .15, an alpha of .05, a standard power level of .80, a total of 15 predictors, a minimum of 139 parent-child dyads from the treatment group would be needed to achieve an adequate power level for this study

Chapter 6: Discussion

The purpose of this study proposal is to propose a replication study of an intervention that targets parent-child communication while building lagging skills identified in deaf children with ODD, specifically those with hearing parents who only use spoken English to communicate with their deaf child. This population is hypothesized to have higher rates of ODD due to the lack of adaptation in the environment to fit the needs of deaf children with limited auditory access. Deaf children who have limited auditory access in an environment that only uses sound-based means to communicate and transmit information are likely to experience restricted incidental learning opportunities, communication, and language difficulties, and lagging skills. With a randomized controlled trial design, the current study proposal presents an investigation for the efficacy of the CPS as a treatment approach in treating ODD severity, aggression, and disruptive behavior while improving child-reported relations with hearing parents among deaf children diagnosed with ODD. Facilitators and barriers to treatment efficacy and client satisfaction will also be assessed to guide future intervention research for this population.

The Role of CPS in Treating ODD and Improving Parent-child Relationships

If the results show that deaf children in the treatment group demonstrated significant declines in ODD outcomes compared to the waitlisted control group over time, this finding would suggest that CPS is an efficacious treatment for deaf children with ODD who use spoken English to communicate with their hearing parents. Although not explicitly tested, this finding may provide supporting evidence for the value of using an explicit, concrete approach to address lagging skills in deaf children and promote the development of prosocial problem-solving skills and world knowledge (Luckner, Slike, & Johnson, 2012; Marschark, Sapere, Convertino, & Pelz, 2008). Additionally, if child-reported relations with parents demonstrate significant improvement over time relative to the control group, this would suggest that CPS may enhance parent-child relationships for deaf children with hearing parents. These findings would increase the plausibility and applicability of the COM-B framework to this underserved population of children where CPS can provide opportunities for the deaf child to develop skills and improve parent-child

relationships. Addressing the five lagging skills and parent-child relationship ultimately strengthens the deaf child's capability and finally, similar to the way self-efficacy emerges, the deaf child's motivation is strengthened.

Implications for these findings suggest a public health impact due to scarce evidence of effective interventions for this population. Further, these findings may have theoretical implications that highlight the important etiological models for the role of parent-child communication in maintaining DBDs in deaf children with hearing parents (e.g., psychological multifactorial model) (see Dammeyer, 2018; Cicchetti & Cohen, 2006; Sameroff, 2014) as well as the COM-B framework. Such models can be tested with a larger sample and more frequent assessments that would allow for the testing of mediation (e.g., CPS→ improved skills including communication→ better parent-child relationships and less DBDs). Taken together, one may infer that CPS is a treatment approach that is capable of generalizing beyond the hearing population. However, whether CPS can be generalized to deaf children who do not share the same language with their hearing parents (e.g., a child using sign language while their hearing parents use spoken language) remains unknown.

The Role of Auditory Access in CPS

If the simple slopes indicate that an increase in auditory access in the treatment group was associated with a decrease in ODD severity, aggression, and disruptive behavior at post-treatment whereas this relationship was not observed in the waitlisted control group, CPS may be better suited for those with higher auditory access. If the pick-a-point method of the moderation analyses indicate that those with high and medium auditory access in the treatment group are significantly more likely to show declines in ODD severity, aggression, and disruptive behavior at post-treatment than the waitlisted control group, with the higher auditory access groups showing the greatest decline and these ODD outcomes are not significantly different between groups for those with low auditory access, then this may suggest that in order to increase the odds of CPS successfully treating ODD in deaf children with hearing parents who only use spoken English, at least a medium level of auditory access is required.

These findings imply that in order for CPS to be effective, parent-child communication must be accessible. This particular finding may have major implications when thinking about providing intervention or treatment services for this population. Since much of psychosocial treatments are heavily dependent on the use of language (Clauss, 1998), such treatments are unlikely to be effective if the language being used is not accessible. These findings also highlight the importance of hearing parents gaining an accurate picture of the extent that their deaf child is able to audibly access information at home as well as other settings outside of the home (e.g., school), especially for families and parent-child dyads who only use spoken language to communicate. Working with speech-language pathologists and audiologists for comprehensive auditory and language evaluations may also help hearing parents gain a better understanding of their deaf child's current auditory access (Rosa-Lugo & Allen, 2011). Expressive language abilities including narrative skills are also used to determine the indirect effects of the deaf child's access to communication (Huttunen & Ryder, 2012; Jones et al., 2016). Therefore, regardless of the appropriateness of a treatment model for this population, providing full access to information and thus communication is a fundamental requirement for optimal psychosocial development and outcomes for deaf children.

The results from such auditory and language evaluations may help hearing parents who only use spoken language (without incorporating any visual cues) re-evaluate the environment they are creating for their deaf child. Otherwise, effective problem solving does not happen without recognizing and addressing the root of the issue. Consequently, adopting a realistic view of their deaf child's auditory access may be especially crucial when considering enrollment in a family or a parent-child intervention or treatment. For example, a treatment that is otherwise highly effective may not be effective due to the deaf child's low auditory access and the lack of adapting the environment to make language – and therefore information – accessible. Therefore, findings from this study may serve as a catalyst for health and mental health providers to broach the topic of parent-child communication between deaf children and their hearing parents before pathologizing the deaf child.

Treatment Satisfaction

If hearing parents in the treatment condition report high satisfaction rates with CPS at post-treatment and maintenance of these rates from post-treatment to 6-month follow-up, this will suggest that CPS may be an acceptable and useful treatment for hearing parents of deaf children with ODD. This result may indicate that hearing parents who report higher satisfaction are also more likely to be compliant to CPS and that their deaf child may have shown a greater response to CPS; particularly since the relationships between treatment satisfaction and treatment compliance, response, and retention have been consistently shown (Saila, Mattila, Kaila, Aalto, Kaunonen, 2008).

Assessing treatment satisfaction is beneficial in terms of addressing the issue of culturally relevant interventions for underserved populations. There is a common assumption where interventions that show efficacy in the general population or the dominant society should be equally effective cross-culturally or with minority groups. Measuring treatment satisfaction could indicate where the strengths and weakness of such interventions (including CPS) lie. Again, due to the dearth of evidence-based interventions and high rates of DBDs for this population, it is necessary to consider the unique needs of these children and test interventions that are already developed and hold particular promise. Additionally, findings that support the initial hypothesis regarding treatment satisfaction will contribute to the support of evaluating this treatment approach with a larger sample.

Alternative Outcomes

Alternatively, for results that are not consistent with the proposed hypotheses or a lack of significant findings, there are several possible explanations to consider. First, even though the current study proposal is adequately powered to detect a medium effect size, it is possible that the current study proposal is underpowered to detect a small effect size. Since the deaf population is considered a low-incidence population (Cawthon & Garberoglio, 2017), meaning deaf children with ODD may represent a much smaller population, successfully increasing the sample size to detect small effects is unlikely. Second, the lack of significant findings could also be attributed to

poor treatment fidelity (Borrelli, 2011). Therefore, the intervention was not delivered at an adequate dosage. However, if treatment fidelity was robust, the inability of hearing therapists to form a strong therapeutic alliance with deaf children is a possible alternative explanation for such nonsignificant findings (Karver, Handelsman, Fields, & Bickman, 2006; Shirk & Karver, 2003).

Third, if auditory access fails to moderate the relationship between CPS and ODD related outcomes, this finding suggests that auditory access may not be an adequate measure of the deaf child's accessibility to information or communication in the home. Thus, accounting for the deaf child's speech intelligibility (Freeman, Pisoni, Kronenberger, & Castellanos, 2017; Most, Ingber, Heled-Ariam, 2011; Netten et al., 2015) and the deaf child's receptive and expressive language (Barker et al., 2009; Romero, Quittner, & the CDaCI Investigative Team, 2010) may provide a stronger moderating relationship between CPS and ODD related outcomes. Alternatively, this finding could lend support to the notion that CPS has led the parent-child dyads to collaboratively problem solve issues surrounding access to communication prior to the end of treatment.

Fourth, as previously mentioned, lack of treatment efficacy for this population may explain consistently low satisfaction rates among hearing parents within the treatment condition (Saila et al., 2008). However, if hearing parents report high satisfaction at post-treatment but this satisfaction was not at least maintained at the 6-month follow-up, the low satisfaction rate at 6-month follow-up may point to several possibilities. One possibility could be that this population may need a longer treatment duration or higher treatment dosage to respond to CPS at the same rate as their hearing peers – especially considering that previous studies have consistently shown how deaf children lag behind their hearing peers on world or background knowledge due to limited access to incidental learning (Luckner & Cooke, 2010 for a review; Hirsch, 2003; Sarchet, Marschark, Borgna, Convertino, Sapere, & Dirmyer, 2014; Van Zeeland & Schmitt, 2013; Vidal, 2011) despite wearing cochlear implants (Convertino, Borgna, Marschark, & Durkin, 2014). This may also mean that in order to bring deaf children up to speed, they would need more exposure to *explicit* teaching (Convertino et al., 2014; Lederberg & Spencer, 2001; Marschark, Spencer, Adams, & Sapere, 2011).

Additional exposure to explicit teaching by having hearing parents practice CPS at home may be necessary to produce expected treatment effects for deaf children with ODD. Another possible alternative for this finding could be attributed to CPS where its long-term treatment effects are lacking, and its usefulness may only be short-term for this population. Regardless, conducting a qualitative analysis of the open-ended responses provided in the CSQ-8 comments and suggestions section may be a useful next step to capture an accurate understanding of low satisfaction rates (e.g., Chow, Quine, & Li, 2010; McLeod, 2013).

Summary

Despite technological advancements (e.g., hearing aids and CIs) and increased access to early childhood intervention services, deaf children continue to be identified with DBDs at a higher rate than their hearing peers (estimated to be 3 to 5 times more likely) (Fellinger et al., 2012; Hall, Li, & Dye, 2018; Stevenson et al., 2010). Since it is the norm for deaf children to be born to hearing parents who are unfamiliar with the deaf population, hearing parents frequently overestimate the magnitude of their deaf child's auditory access for a number of reasons (e.g., the use of a CI or hearing aids, extremely intelligible speech, desire for successful hearing intervention, lack of self-awareness and monitoring, etc.) (Bat-Chava & Deignan, 2001; Gilliver, Ching, & Sjahalam-King, 2013; Rothpletz, Wightman, & Kistler, 2012). It can be costly to overestimate the deaf child's auditory access, especially when combined with the repeated restriction of incidental learning opportunities due to being in an auditory-dominant environment and auditory-based means of information transmission. This repeated lack of incidental learning has been frequently mentioned as a potentially major contributor to language, cognitive, academic, and social-emotional underdevelopment (Bull, 2008; Calderon & Greenberg, 2011; Hintermair, 2014; Kritzer, 2008), behavioral disorders and subsequent mental health problems in deaf children that persist into adulthood (Fellinger et al., 2012; Stevenson et al., 2010).

While there are multiple studies that point to the relationship between deaf children's behavioral problems and restricted communication with family members at home (Barker et al., 2009; Dammeyer, 2018; Hogan, Shipley, Strazdins, Purcell, & Baker, 2011; Stevenson et al.,

2015), intervention studies for DBDs that address parent-child communication between hearing parents and their deaf children (which may boost skill development in deaf children due to explicit coaching from their parents) has yet to be addressed. This study addresses the high rates of DBDs in deaf children with hearing caregivers by evaluating whether CPS is efficacious in enhancing parent and child interactions and addresses the unique communication challenges that deaf children with hearing families often face growing up. Findings from this study could also indicate whether parent-child communication significantly contributes to DBDs in deaf children and if targeting parent and child interactions is an effective means of promoting socially adaptive behavior in this demographic of deaf children.

When accounting for the Coercion Theory and the COM-B model, CPS is a particularly promising intervention to test for this population. The CPS approach may promote hearing parents and their deaf children to expand their parent-child dynamics and spend more time interacting with each other in positive states. Opening up avenues to more positive parent-child relationships may occur as a result of communicating and interacting with one another in a novel and constructive way. As a result, this change may reduce the amount of time spent in coercive cycles. Since lagging skills due to restricted incidental learning and social experiences are likely to maintain or exacerbate DBDs and poor social-emotional and well-being in deaf individuals, CPS addresses this by providing opportunities for deaf children to develop skills which may, in turn, increase the deaf child's capability and parent-child communication (Barker et al., 2009). An increase in parent-child communication may lead to improvements in their relationship and strengthen the deaf child's motivation to maintain positive behavior changes and skill development.

Limitations

There are several possible limitations to consider in this study proposal. First, the study does not utilize HLM, which means random effects cannot be analyzed. Second, even though approximately 95% of deaf children are born to hearing parents (Mitchell & Karchmer, 2004) and nearly 72% of those parents deny using sign language in the home (Gallaudet Research Institute, 2011), the deaf population is a low-incidence population (Easterbrooks, 2017) which means the

population is highly heterogeneous and generalizability is likely to be limited. For example, findings from this study proposal cannot be generalized to families that do not share the same language with their deaf child (spoken English vs. American Sign Language). The third limitation of the study proposal is the use of rating scales. While these types of measurements point to the issue of subjectivity, the current study proposal incorporated several approaches to mitigate this issue. For example, gathering outcome measures from multiple respondents (child, parent, and clinician) as well as conducting, interviews, direct observations (FLEs and CAP-II), and reviewing additional materials (IEP documents and audiological records) to check the accuracy of parent reports on child demographics and characteristics questionnaire (Becker, Hasenberg, Roesnner, Woerner, & Rothenberger, 2004; Choudhury, Pimentel, Kendall, 2003; Van der Meer, Dixon, & Rose, 2008). The fourth limitation refers to the lack of mediators. This makes it challenging to determine the mechanisms of behavior change (Baron & Kenny, 1986; Kazdin & Nock, 2003). Only comparing CPS to no treatment (waitlisted control group) is the final limitation of the current study. The purpose of the current intervention efficacy study proposal is to determine whether there is a benefit of CPS as a treatment compared to the standard of care for deaf children of hearing parents, which is no treatment.

Strengths

The current proposal study has several strengths worth noting. First, this study proposal is a replication study, and due to the paucity of replication studies, researchers are consistently encouraged to conduct them because it helps identify fraudulent findings, validate or confirm previous findings, limit sampling error and artifacts, generalize or extend findings to other populations, and resume the evaluation of the initial hypothesis from an earlier study (Schmidt, 2009). Not only is this a replication study that builds upon a previous randomized controlled trial (see Ollendick et al., 2016), this study also intends to determine whether the benefits of CPS extend to an understudied, underserved, and underrepresented population of deaf children with hearing caregivers. Results from this study would provide evidence as to the efficacy of this approach to diverse populations.

Additionally, the current study proposal included a moderation analysis to identify potential subgroup differences. This process of identification may help pinpoint which subgroup is most likely to benefit from CPS and whether the restricted range of auditory access is a factor that needs to be addressed with their hearing caregivers before treatment begins to increase the chances of experiencing a successful treatment. This will also help inform specific sub-populations that could be targeted by CPS. For example, if the findings are consistent with the moderation hypotheses, CPS may be more appropriate for children who regularly experience accessible communication and language at home.

Implications and Future Directions

Decades of studies on this population have consistently attributed issues of development in deaf children across multiple domains (e.g., language, social-emotional, etc.) in the home environment (Lam & Kitamura, 2012; Morgan et al., 2014), particularly the quality of interactions between hearing parents and their deaf children (Lam & Kitamura, 2010). While multiple efforts are underway to address this issue of parent and child interactions, such interventions often target younger deaf children (birth to five years old) (DesJardin, 2003; Lam-Cassettari, Kamble, & James, 2015; Moeller, 2000). This leaves out hearing parents with older deaf children who need treatment to address parent-child relationships or interactions.

Providing treatment for older deaf children where they can develop problem-solving skills along with other key competencies is especially crucial for deaf children, who experience an increase in barriers to communication and challenges with accessing information around them throughout adolescence and adulthood (Punch & Hyde, 2011). With typical child development, the complexity of language increases throughout the years. The deaf child can be at risk for further detrimental lags in development and outcomes if hearing caregivers are not readily conscious of these challenges and lack the appropriate skills for accessible parent-child communication and problem-solving (Vaccari & Marschark, 1997). Therefore, this study may provide hearing caregivers the opportunity to repair or improve their relationship with their deaf child who is beyond the early intervention age.

If the results indicate CPS benefits deaf children with hearing caregivers where significant reductions in ODD severity, aggression, disruptive behavior, and ODD symptoms are observed, an appropriate next step will be to compare CPS and Parent Management Training (PMT) (Barkley, 1987, 1997c), a gold-standard treatment for children with externalizing behavior (in the general population) for deaf children with hearing caregivers. If CPS outperforms PMT as a treatment for this population of interest, then a recommended follow-up study would be to recruit a larger sample of deaf children and incorporate mediators to identify what contributes to behavior change (mechanisms of therapeutic change) (Kazdin & Nock, 2003). Parent-child communication is a recommended candidate mediator since the implications of the literature on this population along with appropriate theoretical foundations suggest that improving communication between deaf children and their hearing caregivers may lead to enhanced parent-child relationships, which in turn may motivate behavior change in deaf children. However, highly reliable and valid parent-child communication (e.g., communication quality) measures for hearing parents and older deaf children are lacking. Instead, such communication measures are often restricted to young deaf children (e.g., the observed frequency of parent-child communication, parent-reported language, and communication skills, and observed parent-child interaction styles such as joint attention) (Barker et al., 2009; Lam-Cassettari et al., 2015)

Moreover, given that this is a randomized controlled trial consisting of multiple respondents and measures, there are opportunities to run several follow-up analyses using the data collected from the initial study population. For example, using a mixed-methods approach to identify whether deaf adolescents' satisfaction with CPS rates were consistent or disparate from their hearing parents' satisfaction rates of CPS. Another example of a follow-up study that may be worth exploring is determining whether deaf children in the CPS condition demonstrated significant improvement in any of the five lagging skills identified at the beginning of treatment to post-treatment and whether those skills continued to grow after treatment at 6-month follow-up.

Finally, this study will count as the first randomized control trial testing the efficacy of a psychosocial intervention that centers on parent and child communication and the development of

skills that are lagging in deaf children (with hearing caregivers) who have been diagnosed with DBDs. Considering that deaf children already represent a low-incidence population and that deaf children *with* DBDs may represent an even smaller population, this RCT study will produce significant implications in guiding subsequent research and inform the practice of professionals who interact with this population and parent-child dynamics. More importantly, this study may open the door for potentially ground-breaking research on how addressing parent-child communication and lagging skills may play a crucial role in the well-being and social-emotional development of deaf children with hearing parents.

Appendices

Appendix A

Variables and Measures

Child and Parent Demographics & Characteristics (prior to treatment randomization). The Colorado Individual Performance Profile (CIPP) (The Colorado Department of Education Special Education Services, 2002) is a multipurpose tool used to collect information regarding children in first grade or above with deaf as a primary or secondary disability. The CIPP includes two components: Student Demographic Information and Student Assessment Summary. However, for the purposes of the current study, only the information provided on the Student Demographic Information component will be administered to the primary caregiver following appropriate adaptions to the tool (e.g., include ethnicity/race, maternal educational attainment, current psychiatric prescription(s) [e.g., dose and primary reason for prescription], identification of the child's primary caregiver). The primary caregivers will also be instructed to incorporate the child's most recent IEP documents and audiological records to determine the caregiver's reporting accuracy of their child's information. Results from the CIPP, IEP documents, and audiological records in addition to other measures will help determine whether the child and their primary caregiver are eligible for the study.

Nonverbal Intelligence (prior to treatment randomization). The Leiter International Performance Scale-Revised (Leiter-R; Roid & Miller, 1997) will be administered to all deaf children eligible for the study. This screener can be administered to children from 2 to 20 years old. However, for the purposes of this study, only a component of the Leiter-R test, the Leiter Brief IQ screener (Roid & Miller, 1997), will be used to obtain a general estimate of intellectual functioning without the influence of language. The Brief IQ screener portion, which takes approximately an half hour to conduct the Visualization and Reasoning cognitive subtests (Roid & Miller, 1997).

Auditory Access (prior to treatment randomization). The Categories of Auditory Performance II (CAP-II) (Gilmour, 2010) is a modified form of the CAP (Archbold, Lutman, & Marshall (1995). The original CAP (Archbold, Lutman, & Marshall, 1995) is commonly used in

research and to inform professionals and parents across the globe on how much their deaf child is able to access sound-based information (e.g., recognize environmental and speech sounds). The CAP-II expanded from a seven-point scale to a nine-point scale to avoid ceiling effects. This single-item scale ranges from zero ("no awareness of environmental sounds") to nine ("use of telephone with unknown speaker in a unpredictable context") (Gilmour, 2010). Higher scores indicate higher auditory access. While this measure is commonly used to evaluate the benefits of CIs, this measure has also been used for deaf children with hearing aids and without any listening devices (Dammeyer, 2009). Additionally, the original measure has demonstrated excellent inter-rater reliability (r = .97) between teachers who frequently interacted with their deaf students and teachers at the CI center who did not interact with those students as much. For the current study proposal, this will be used as a final score following the Functional Listening Evaluation (FLE) (Johnson & Von Almen, 1993) administered and scored by two speech language pathologists who are a part of the research team. All FLEs will be video recorded for the purposes of checking scoring accuracy of the CAP-II. The lead SLP to randomly select and review 20% of the FLEs done by each SLP.

Functional Listening Evaluation. The FLE is mainly used in school systems to evaluate deaf student's range of accessibility to auditory based communication and speech or lipreading within quiet and noisy environments (Johnson & Von Almen, 1993). In other words, the purpose of the FLE is to identify how a child's listening abilities are affected by more realistic and practical listening conditions such as the environment's noise, distance from the speaker, and visual access of the speaker. Since this evaluation produces several distinct scores for each listening situation that the deaf child will observed in, the CAP-II provides a summative singular score of the deaf child's auditory access.

Receptive Language (prior to treatment randomization). The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4) (Dunn & Dunn, 2007) is a norm-referenced and individually administered test to capture the receptive lexicon of individuals (ranging from 2 years and 6 months to 90 years old and up) in English across 20 content areas (e.g., vegetables, actions,

etc.). Each form from this edition involves 228 questions, on which each item consists four pictures as response options. Normative scores of this measure is nationally representative as it matches the 2004 Census data for socioeconomic status (SES), region, gender, race/ethnicity clinical diagnosis or special education placement. The reliability and validity coefficients of this measure are excellent (with all coefficients within the .90s) (Dunn & Dunn, 2007).

Expressive Language (prior to treatment randomization). The Expressive Vocabulary Test, Second Edition (EVT-2) (Williams, 2007) is a norm-referenced and individually administered test that assesses both expressive lexicon and word retrieval in individuals (ranging from two and half to 90 years old and up) who use spoken English. Co-normed with the PPVT-4, the EVT-2 also has two parallel forms (Form A and B) available. On this test, there are 190 items arranged in a manner that increases in difficulty. The examinee is expected to respond with an one word or synonym that is appropriate for the question or picture administered. The reliability coefficients of the EVT-2 range from good to excellent (.83 to .97). EVT-2 also indicated moderate to high convergent validity and high content validity (Williams, 2007).

ODD severity (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-C/P) (Silverman & Albano, 1996) is a semi-structured diagnostic interview for nearly all psychiatric disorders in minors. A clinician severity rating (CSR) is developed according to the interference ratings on a nine point scale which are determined from symptoms that the clinician assesses in the interview along with the collection of relevant information such as the frequency and intensity of the symptoms. Receiving a CSR of four or higher on a zero to eight scale reflects a psychiatric diagnosis. The CSR score will be used as the outcome variable. In diagnosing ODD and ADHD as well as anxiety and affective disorders, the ADIS-C/P was deemed as a reliable and valid diagnostic interview (see Anderson & Ollendick, 2012; Jarrett, Wolff, & Ollendick, 2007). Specifically, the ADIS-P was reportedly estimated to have a sensitivity of .98 and specificity of .40 (Anderson & Ollendick, 2012). In the Ollendick et al. (2016) study, this variable was defined as either the absence or presence of ODD as a clinical diagnosis determined

at post-treatment assessment by the consensus diagnosis on the ADIS-C/P and at 6-month follow-up. CSR less than four was determined by the previous study to be considered in remission of ODD as a clinical diagnosis (Ollendick et al., 2016).

Aggression (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Behavior Assessment Scale for Children – 2nd Edition (BASC-2) (Reynolds & Kamphaus, 2004) assesses feelings, behaviors, and perspectives in children and adolescents. For the purposes of the current proposal study, only the Aggression subscale within the Parent Rating Scales (PRS) will be the focus (as it was in the Ollendick et al. 2016 study). T-scores equal to or greater than 70 represents the clinically significant range and signifies that intervention is necessary whereas T-scores 60 to 69 reflect "at-risk" which warrants continued monitoring of the individual, but intervention is not needed at the moment. The Aggression scale of the PRS has demonstrated a range of excellent to good internal consistency (.80 to .90; Kamphaus & Frick, 2005; Anderson & Ollendick, 2012; Ollendick et al., 2016) and acceptable to excellent test-retest reliability from 2- to as long as a 8-week period (.74 to .94; Reynolds & Kamphaus, 1992). Like the previous study, the BASC-2 will be administered at three time points: prior to treatment, a week after treatment, and six months post-treatment (Ollendick et al., 2016).

Child-Reported Relations with Parents (prior to treatment randomization, one-week post-treatment, and at 6-month follow-up). The Behavior Assessment Scale for Children – 2nd Edition (BASC-2) (Reynolds & Kamphaus, 2004) assesses feelings, behaviors, and perspectives in children and adolescents. For the purposes of the current proposal study, only the 11-item Relations with Parents of the Self-Report of Personality (SRP) form will be of primary interest (as it was in Booker et al., 2018, a follow-up study of the Ollendick et al., 2016 study). On this form, deaf children will be asked to report on their perceptions of the quality of the parent-child relationship (e.g., "I like to be close to my parents" and "I get along with parents"). Items also address the perceived level of parental involvement, trust, closeness, and interactions with parents. This scale was described as an indicator of family conflict and disruptive behavior (Weis & Smenner, 2007, p. 124). The Relations with Parents scale of the SRP demonstrated good internal

consistency (.85-.86; Booker et al., 2018) and good to excellent test-retest reliability for approximately 6 weeks (.84-.90; Reynolds & Kamphaus, 2010).

ODD Symptoms (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Clinical Global Impression (CGI) (Guy, 1976) provides a brief, independent, and subjective assessment of the child's overall functioning (Busner & Targum, 2007). While this is a summary of the clinician's evaluation of a patient, the clinician will take into the account of all the patient's information (e.g., background, psychosocial circumstances, symptoms, behavior, how the symptoms may be affecting on patient's functionality). The CGI has two versions, however, with one measuring Severity (GCI-S) and the other measuring Improvement (GCI-I) (Guy, 1976. The CGI-S has one item: "Considering your total clinical experience with this particular population, how mentally ill is the patient at this time?" (Guy, 1976). Like the previous study, the CGI-S will be completed by the same masked outcome evaluators who administered the ADIS-IV C/P with the dyads. The CGI-S consists of a seven-point rating scale of the child's current general impairment in functioning ranging from one ("normal, not at all ill") to seven ("among the most extremely ill patients") (Guy, 1976). The CGI-I follows the CGI-S where the clinician provides an overall subjective assessment of the child's current functioning level post-treatment and at 6-months follow-up. Like the previous study, the same masked evaluator who conducted the outcome assessments will provide one rating on a seven point scale from one ("very much improved since the initiation of treatment") to seven ("very much worse since the initiation of treatment") to answer one question: "Compared to the patient's condition at the admission to the project [prior to treatment initiation], this patient's condition is" (Guy, 1976).

Disruptive Behavior (prior to treatment randomization, one-week post-treatment, and at 6-months follow-up). The Disruptive Behavior Disorders Rating Scale (DBDRS) (Barkley, 1997c; Pelham, Gnagy, Greenslade, & Milich, 1992) is a scale that assesses ODD, CD, and ADHD symptoms based on the DSM-IV. This scale consists a four-point scale ranging from zero ("not at all") to three ("very much") (Barkley, 1997c; Pelham, Gnagy, Greenslade, & Milich,

1992). Score of a four or above on the eight symptoms listed under ODD indicates possible ODD. The scale has exhibited excellent internal consistency in the Ollendick et al. (2016) study. Like the previous study, this measure will be completed by the primary caregivers at each assessment point.

Treatment Satisfaction (one-week post-treatment and at 6-months follow-up). The Client Satisfaction Questionnaire (CSQ-8) (Attkisson, 2012; Attkisson & Zwick, 1982) is a measure with separate forms for adolescents and their caregivers, consisting of eight items. Only the caregiver forms are of primary interest for the purposes of this current study proposal. Even though a study has piloted an adapted version of this measure (with smiley faces) for young children, the developers of the adapted measure are still seeking collaborative opportunities with interested investigators to further develop this measure. The caregivers are asked to rate each item on a four-point Likert scale with higher scores indicating greater satisfaction. Examples of the items on this measure are ("How satisfied are you with the amount of help you have received?") with response options ranging from one ("quite dissatisfied") to four ("very satisfied") and ("Have the services you received helped you to deal more effectively with your problems?") with the following response options ranging from one "(no, they seemed to make things worse") to four ("yes, they helped a great deal") (Attkisson, 2012; Attkisson & Zwick, 1982). The CSQ scales have been translated into multiple languages and has demonstrated good to excellent internal consistency (α = .83 to .93) and moderate correlations with other treatment outcome measures such as the Brief Psychiatric Rating Scale and reduction in symptoms as measured by the Client Checklist (Attkisson & Zwick, 1982; LeVois, Nguyen, & Attkisson, 1981; Roberts, Attkisson, & Mendias, 1984).

Appendix B

Data Collection Timelines

Table 1. Measures of Child Characteristics

Time 1	Time 2	Time 3
Child Auditory Access		
Functional Listening Evaluation (FLE)		
Categories of Auditory Performance, 2nd Edition (CAP-II)		
Child Speech Intelligibility		
McGarr Sentence Intelligibility Test		
Child Expressive and Receptive Language		
Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4)		
Expressive Vocabulary Test, Second Edition (EVT-2)		
Child's Nonverbal Intelligence		
Leiter Brief IQ Screener		

Table 2. Parent Report Measures

Time 1 (prior to treatment randomization)	Time 2 (one week following treatment)	Time 3 (6-months follow-up)
Demographics & Characteristics		
Colorado Individual Performance Profile (CIPP)		
Child ODD Severity		
Anxiety Disorders Interview Schedule for DSM-IV, Parent Version (ADIS-P)	Anxiety Disorders Interview Schedule for DSM-IV, Parent Version (ADIS-P)	Anxiety Disorders Interview Schedule for DSM-IV, Parent Version (ADIS-P)
Child Aggression		
Behavior Assessment System for Children – 2nd Edition (BASC-2)	Behavior Assessment System for Children – 2nd Edition (BASC-2)	Behavior Assessment System for Children – 2nd Edition (BASC-2)
Child Disruptive Behavior		
Disruptive Behavior Disorders Rating Scale (DBDRS)	Disruptive Behavior Disorders Rating Scale (DBDRS)	Disruptive Behavior Disorders Rating Scale (DBDRS)
Treatment Satisfaction		
	Client Satisfaction Questionnaire	Client Satisfaction Questionnaire

Table 3. Child Report Measures

Time 1	Time 2	Time 3
Child-Reported Relations with Parents		
Behavior Assessment System for Children – 2nd Edition (BASC-2)	Behavior Assessment System for Children – 2nd Edition (BASC-2)	Behavior Assessment System for Children – 2nd Edition (BASC-2)
Child ODD Severity		
Anxiety Disorders Interview Schedule for DSM-IV, Child Version (ADIS-C)	Anxiety Disorders Interview Schedule for DSM-IV, Child Version (ADIS-C)	Anxiety Disorders Interview Schedule for DSM-IV, Child Version (ADIS-C)

Table 4. Clinician Report Measures

Time 1	Time 2	Time 3
Child Symptoms		
Clinical Global Impression – Severity (CGI-S)	Clinical Global Impression – Improvement (GCI-I)	Clinical Global Impression – Improvement (GCI-I)
Anxiety Disorders Interview Schedule for DSM-IV, Clinician Severity Rating (ADIS-CSR)	Anxiety Disorders Interview Schedule for DSM-IV, Clinician Severity Rating (ADIS-CSR)	Anxiety Disorders Interview Schedule for DSM-IV, Clinician Severity Rating (ADIS-CSR)

Appendix C

Treatment Non-Completer Survey

1) What was the primary reason that led you to sign up for the study?

2) What was the primary reason for discontinuing? Please circle one.
    a. Scheduling conflicts
    b. CPS as a treatment was not effective
    c. Did not receive treatment (waitlisted)
    d. Other : _____

3) Do you have any other comments or suggestions?

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